AUGUST 27, 1955
VOL. 149 — NO. 9

Telephony®

THE JOURNAL OF THE TELEPHONE INDUSTRY

"SALES BY PHONE"

The General Telephone Co. of Michigan developed a "Shop by Phone" window display with Muskegon's Grossman's Department Store, which established a sales department to handle orders from a special "Shop by Phone" number.

Guaranteed Circulation This Issue
13,978 of Which 12,310 is Paid

MANAGEMENT • PLANT • TRAFFIC • COMMERCIAL • LEGAL • ACCOUNTING

a FIRST look . . .

New Airtronics MULTI-PURPOSE, PORTABLE test hybrid set

CHECK THESE SPECIFICATIONS

120 P Repeat coil hybrid, specially adjusted for high trans-hybrid balance

128 type low pass filter

Precision 1% capacity decades on NBO

Internal switching provided for two most commonly used networks

Plug-in network arrangement, compromise net built in

Line and Net simplex leads brought out to pin jacks on front panel for special testing procedures

Convenient panel lay-out, jacks and binding posts to facilitate connection to line or external circuits

600 ohm impedance on 4 wire legs

900 ohm impedance on line, (a built-in switch permits change to 1500 ohm impedance line)

ALSO AVAILABLE

External decade capacitor and variable resistor (3 terminal) for use in locating cable opens, for compromise net, etc.

Plug-in dial to facilitate testing procedures

- **makes acceptance tests easier, faster**
- **locates cable opens accurately**
- **accommodates standard networks**

Now, a completely portable precision test hybrid for transmission engineers and testers — ruggedly built, and packaged for maximum convenience and flexibility. Use Airtronics new Test Hybrid Set for cable and trunk acceptance tests, circuit evaluation, capacity balance tests, acceptance and evaluating tests using Singing Point or Return Loss techniques, plus other specialized applications. Use it, too, to locate — with *Airtronics unique new "Cable Locator"* — some of those "lost" cable pairs currently unavailable for use because of opens! This exciting innovation in telephone test equipment determines, with new accuracy, distance to an open end — by a capacity comparison method, with capacity measured to ±1%.

Modernize — simplify — your testing procedures with the new Airtronics Multi-purpose Portable Test Hybrid Set, Model 20B. It is designed to use standard type 115H or 115AL Precision Networks, available in all toll offices.

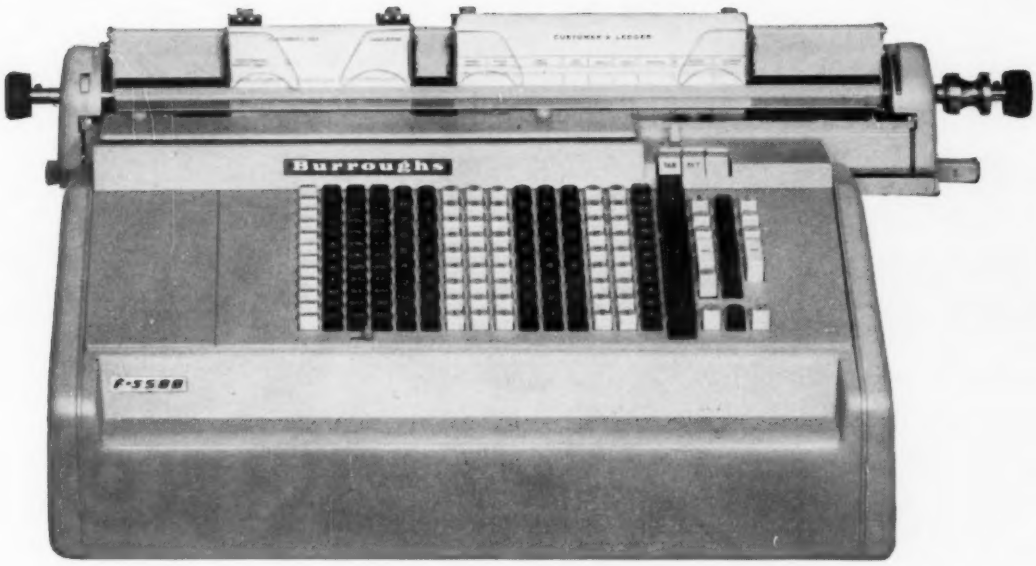
another product FIRST from

AIRTRONICS INTERNATIONAL CORPORATION

P.O. Box 8576, Fort Lauderdale, Florida (6900 West Road 84)

13 NOW: DUAL PRINTING AUTOMATION FOR TELEPHONE COMPANIES! 13

BURROUGHS SERIES F-5000 TELEPHONE BILLING MACHINE



Here's the machine to automate your telephone billing—the Burroughs series F-5000!

It automatically and simultaneously prints two identical original records in a single posting cycle. Balances are automatic without key depression. There are no extra operator decisions to make, no extra keys to punch. It's the perfect combination of dual printing and fully automatic accounting.

And check these extra advantages: • Automatic plus and minus subtotals and totals. • Automatic dating. • Fixed limit form alignment. • Single motor bar operation for 90% of all entries. • Automatic carriage position control of addition, subtraction, non-addition, subtotaling and totaling. • Complete keyboard control of error correction.

For a demonstration and details, call our nearby branch office. Or write Burroughs Corporation, Detroit 32, Michigan.

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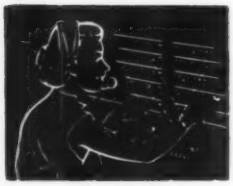
Burroughs Corporation

"NEW DIMENSIONS / in electronics and data processing systems"



FLASHES AND PLUGS

TELEPHONE MENDED ALL TROUBLES. "Mount Vernon, N. Y., had until recently a unique telephone service. It was called the Gripe Telephone and its number could be found under listings for the city of Mount Vernon.

"If any one had a grievance, he dialed MOunt Vernon 4-7878 and aired his complaint. A polite city official at the other end of the line would do his best to remedy matters.

"For four years, this number was rung by people whose complaints ranged all the way from the man who announced that he had squirrels in his attic to the woman who was convinced that somebody was trying to steal her electricity. But oddly enough, the telephone ran out of gripes.

" 'We got only one or two calls a month,' " explained the public works commissioner.

"It seems, that gripers preferred to deal directly with the men they thought could clear up the matter personally. Once the novelty had worn off, the gripe telephone spent long idle hours in a corner of the office of the department of public works. The instrument was finally removed."—AT&T's *Long Lines.*

•

"TELEPHONES" FOR DINNER. One of TELEPHONY's correspondents informs us that there is a new variety of garden peas, named "the Telephone."

There are two kinds—a dwarf one called "Daisy" which is on the plump side and a tall one named "Alderman" which is very large and has nine big oval peas per pod.

Just how these vegetables got their name is not exactly known but there have been various suggestions as to its origin.

Some say the vines look like telephone lines or wires. Another school of thought reports that the name came from the curve-like structures resembling the "cradle" piece of a modern telephone. Another interpretation has it that the pod's length is suggestive of the slim body of the old fashioned telephone.

A most reasonable explanation is that they are so good that those eating them would like to reach for the telephone to tell their friends about them.

•

TELEPHONE BRAINWASHING. The Associated Press reports that Cuban telephones have a new sound. Along with the ringing that precedes a connection, a female voice repeats the slogans: "On with Fidel" and "Fatherland or death."

The American-owned Cuban Telephone Co. has been intervened by the Castro government.

CHANGE OF ADDRESS

Please notify your local postmaster and the Circulation Department of TELEPHONY of change of address. Change cannot be made without the old as well as the new address. Allow three weeks for change of address to become effective.

Telephony

THE JOURNAL OF THE TELEPHONE INDUSTRY
Since 1901

August 27, 1960

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Published every week on Saturday by TELEPHONY PUBLISHING CORP., 608 S. Dearborn St., Chicago 5, Ill. Entered as second class matter at the Post Office at Chicago, Ill., under the act of Mar. 3, 1879. 30c per copy (except special issues—50c). Subscription $4.50, 1-year; $7.00, 2-years; $9.00, 3-years. Add $1.00 per year for postage to Canada and Pan American countries; $2.00 per year to Foreign countries. Telephone WAbash 2-2435.

Here's where we make the "milestones"

Power equipment created by Lorain..."milestones" in the telephone industry ...is engineered and built in these four plants.

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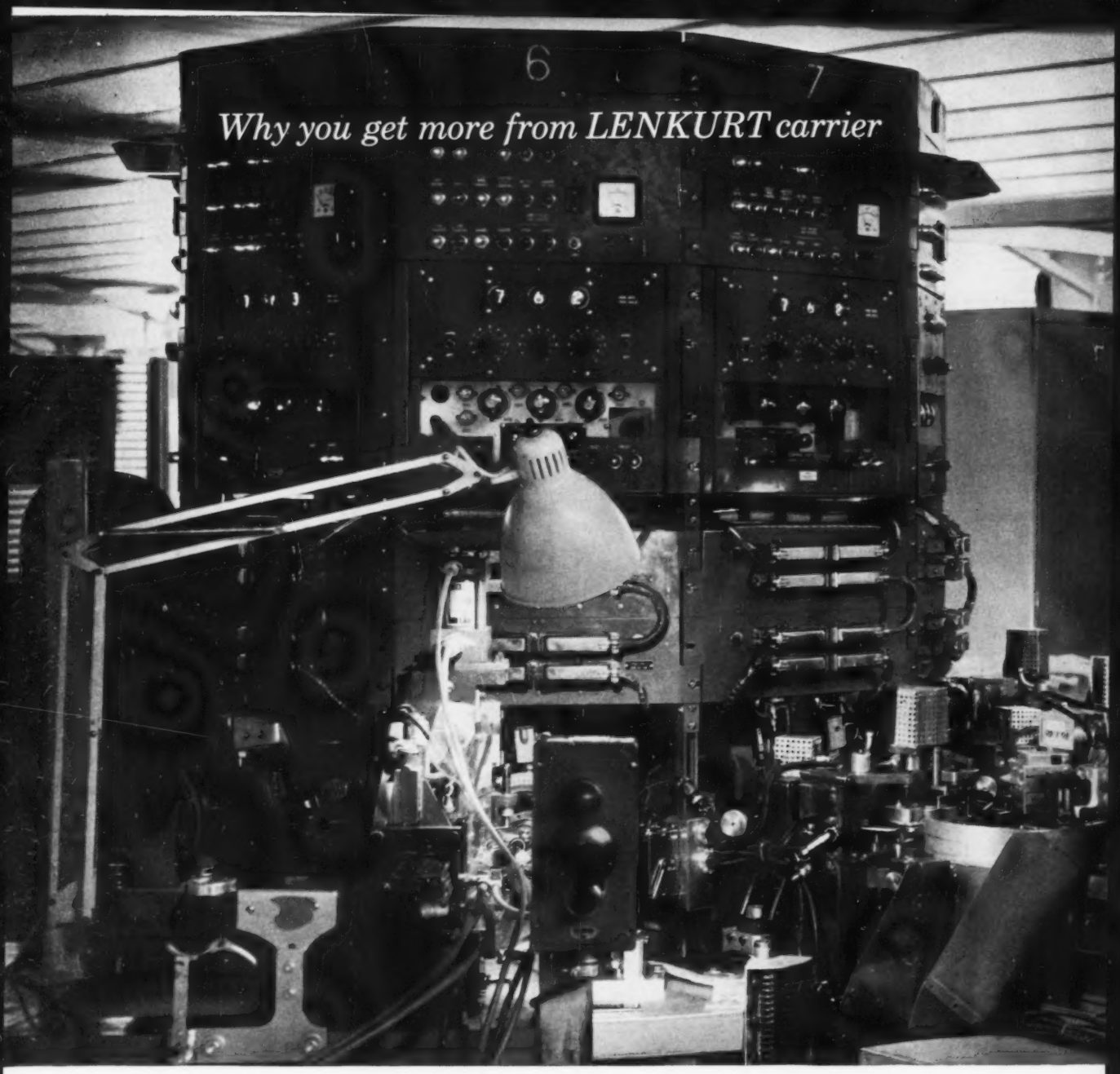
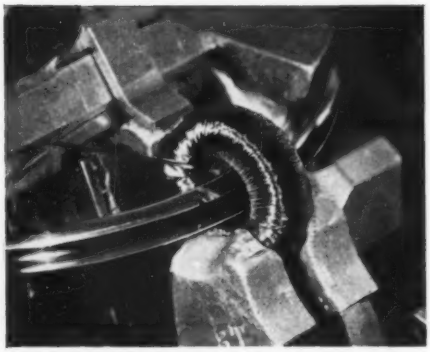
LORAIN *Products Corporation* LORAIN, OHIO

LORAIN PRODUCTS (CANADA) LTD.—ST. THOMAS, ONTARIO

DESIGNERS AND MANUFACTURERS
SUB-CYCLE® CONVERTERS
FLOTROL® RECTIFIERS
PARTNERS IN DEPENDABILITY



Automatic winding and grading of



The heart of any frequency-division system lies in its filters, and the success of the filters is highly dependent on the ability of their toroidal chokes and transformers to sharply define a precise frequency spectrum.

Because coils with a sufficiently high degree of uniform tolerance just weren't on the market, Lenkurt has always manufactured its own . . . individually winding each coil to exact electrical specifications. To meet the growing demand for Lenkurt equipment (and the need for toroidal coils), Lenkurt has developed and built unique automatic machinery for toroid fabrication.

Lenkurt coils assure you precise transmission

This "Carousel" produces more than 2100 coils a day. It performs every step in the fabrication, from molding the cores and measuring their individual characteristics to calculating and counting turns of wire . . . compensating for core variations with no chance for human error. It then automatically tests the performance of the finished units. Such automation assures fullest use of frequencies within each channel unit of Lenkurt carrier systems.

This is an example of the advanced thinking and planning that go into all Lenkurt telecommunications products. They are engineered with *your* future in mind.

Before you spend a penny for additional circuits, ask your AE representative for more information on Lenkurt carrier for open wire, cable, or microwave. He can help you with system planning, too. Or contact the Director, Carrier & Radio Sales, at Automatic Electric Sales Corporation, Northlake, Illinois.

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GENERAL TELEPHONE & ELECTRONICS

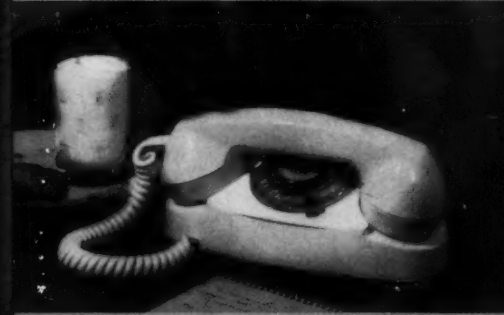
GENERAL SYSTEM

The Petite

by Stromberg-Carlson

The PETITE is the perfect bedside phone. It's smart; it's small; it LIGHTS!

It's so handy in the kitchen . . . takes so little space.



Ideal for teen-ager's room and all around the house. Choice of white, beige, blue, pink or turquoise.

It's SMART...it's SMALL...it LIGHTS...

The PETITE is the greatest little profit producer to come your way in many a year.

It's completely new, yet uses time-tested standard components. Small and dainty—but rugged as well. Compact and trim, with full-range 500-type transmission and reception. Smart and modern—to fit beautifully in any room or location. It's the perfect extension phone. With the new, small wall-mounted ringer, PETITE can be used as a main station. And the dial lights up! No fumbling in the dark; so the user can find the phone easily. And when the handset is lifted, the dial lights up brightly for easy dialing.

The best feature of all is the revenue story. Your Stromberg-Carlson representative will be happy to give you the eye-popping figures, plus prices and ordering information. Delivery from stock now! In Atlanta call TRinity 5-7467; Chicago: STate 2-4235; Kansas City: HArrison 1-6618; Rochester: HUbbard 2-2200; San Francisco: OXford 7-3630.

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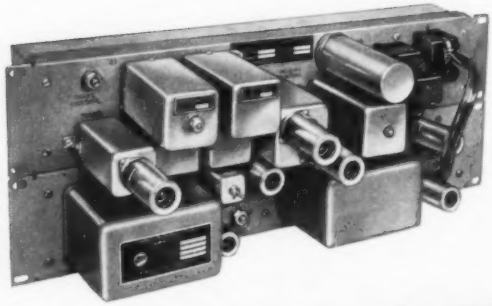
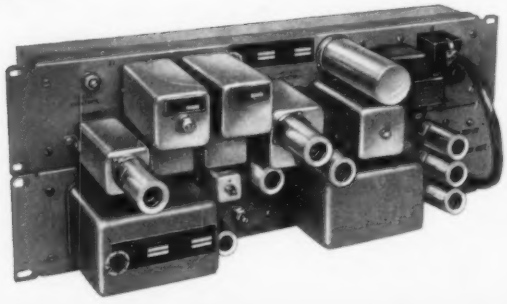
ARE DEMANDS FOR EXTENDED SERVICE GIVING YOU HEADACHES ?

The low cost
remedy
that will
cure
your problems
NOW!

Rx: NORTH CARRIER





Ad 60-T-13

If the demands for additional trunking facilities and added subscriber service keep you awake nights—if the potential expense of physical line construction has you over a barrel—NOW is the time to talk to your North Field Engineer. He can show you how North Carrier can solve your problems. North Trunk Carrier and North Subscriber Carrier have been designed and built specifically to meet the requirements of the Independent Operating Company.

Low in cost, simpler in circuitry for ease of maintenance, proven-in-use, North Carrier will enable you to extend your service without extending your physical lines.

Cure those headaches now—see your North Field Engineer or write for full details on North Carrier.

You're always better off when you come to

THE DYNAMIC FORCE IN THE TELEPHONE INDUSTRY

NORTH ELECTRIC COMPANY

GALION, OHIO

Ad 60-T-13

Sell the telephone

that sells itself...

Kellogg K-500

So far as Mr. and Mrs. Average Subscriber are concerned, when you say "Telephone," you're talking about a K-500 instrument . . . the telephone with a nationally known and accepted design.

Here's why it's so easy to sell Kellogg K-500s. Your subscribers are exposed to millions of dollars of advertising on the K-500 design each year. It's the telephone they know and want when they're thinking of color or extension phones . . . those extra instruments in a home that mean *extra* revenue for you!

K-500s set the industry's standards of design and performance: no other instrument has been so thoroughly tried and tested as this; no other can match it in quality and engineering.

Ask your Kellogg representative to explain all the K-500's technical advantages . . . or to help you work out a money-saving monthly shipping plan geared to your needs . . . and to show you the low-cost promotional materials available for your use.

Kellogg Switchboard and Supply Company, 6650 South Cicero Avenue, Chicago 38, Ill.
Communications Division of International Telephone and Telegraph Corporation.

KELLOGG
Communications Division of IT&T
CHICAGO, ILLINOIS

Regional Offices and Warehouses:

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OXford 7-5780.

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SYcamore 4-2441.

ILLINOIS:
4600 So. Tripp Ave., Chicago 32, Illinois,
CLiffside 4-4300.

KANSAS:
7th & Sunshine Road, Kansas City 15, Kansas,
MAyfair 1-4418.

NEW YORK:
327 North West Street, Syracuse, N. Y.,
HArrison 2-9251.

TEXAS:
1359 Motor St., Dallas 7, Texas,
RIverside 7-5191.

EXPORT:
4600 So. Tripp Ave., Chicago 32, Illinois,
CLiffside 4-4300.

Standard desk and wall models come in 11 popular colors: aqua blue, light beige, red, green, ivory, light gray, yellow, white, rose pink, black, and sea green.

LEICH

LINE CONCENTRATOR

PROFITABLE USES

Saves $21,915 in Small

Imagine! A unit that saved $21,915 while serving a small growing community.

That's exactly what Leich's Line Concentrator did by cutting outside plant costs. Instead of serving each line over a separate wire pair, it concentrates a number of subscriber lines over a much smaller "high usage" trunk group.

The cost-cutting story: This small community was fed over a 26 pair cable which was working at 100 per cent capacity. There was an immediate need for 8 more lines with a projected 15 year ultimate of 10 more lines for a total of 18. Six of the existing lines and 7 of the new lines required long line adapters.

The cost estimate for an additional 26 pair, 19 gauge cable plus loading was $30,000.

The cost of the Line Concentrator plus weatherproof cabinet and installation labor was $4,785. In addition, it was necessary to move the distribution point of the Concentrator's subscriber unit back toward the central office to get within trunk limits for Concentrator operation. The cost was an additional $3,700 for a total of $8,485.

This figure was reduced to a net cost of $8,085 by applying long line adapters to the 9 Concentrator trunks rather than 13 long lines.

Savings from use of the Concentrator: $21,915!

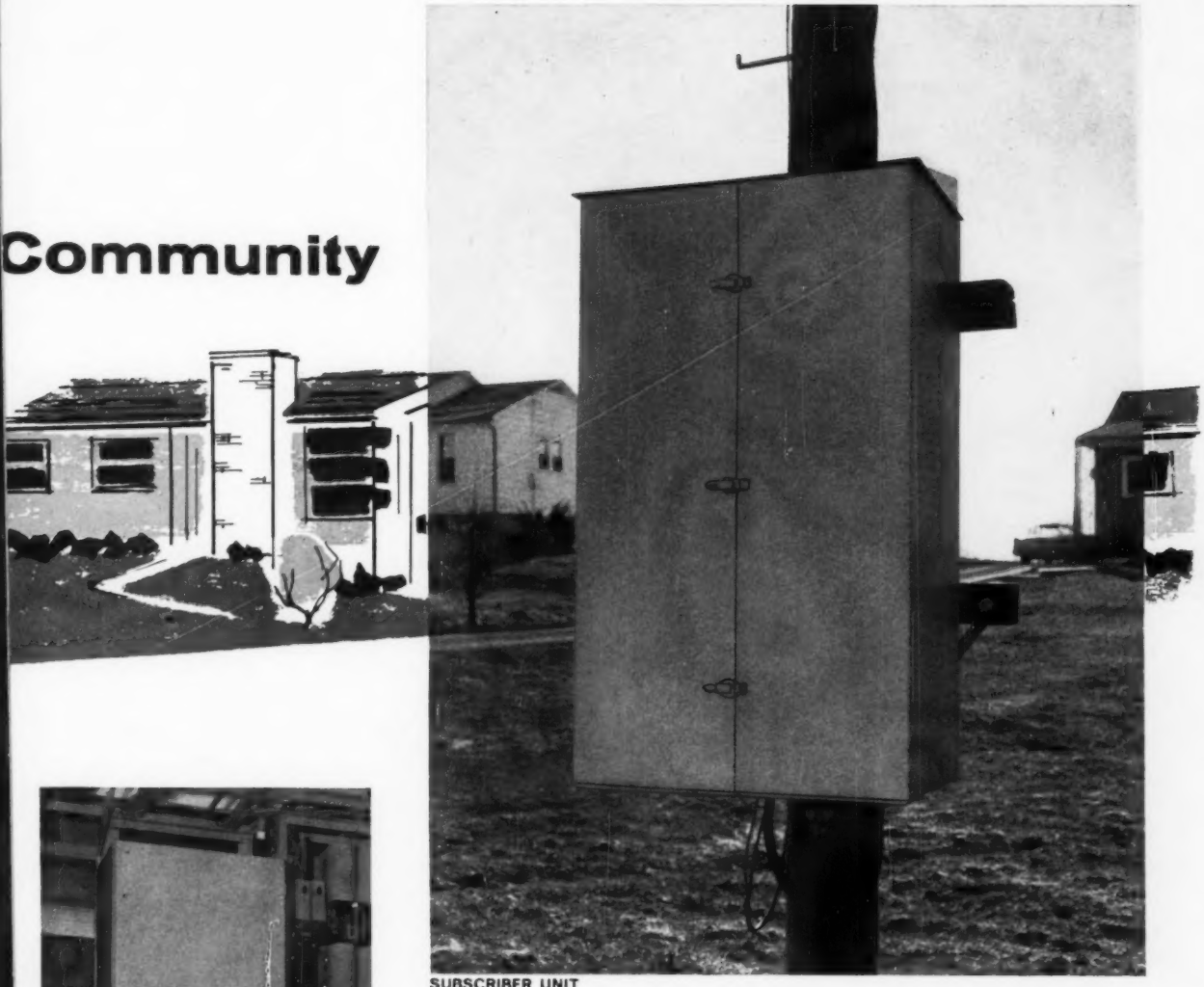
LEICH

GENERAL SYSTEM

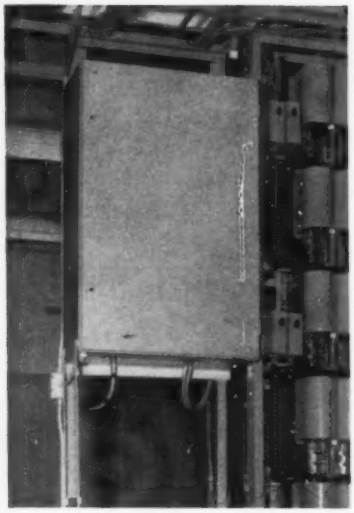
Subsidiary of

GENERAL TELEPHONE & ELECTRONICS

Community



SUBSCRIBER UNIT



EXCHANGE UNIT

Write for Brochure of Line Concentrator Facts and Applications.

LEICH SALES CORPORATION • 427 WEST RANDOLPH STREET • CHICAGO 6, ILLINOIS

PACIFIC COAST: 11401 W. PICO BLVD., LOS ANGELES 64, CAL.

SOUTHWEST: 1227 SLOCUM STREET, DALLAS 7, TEXAS

EAST: 3651 CONNECTICUT AVENUE, YOUNGSTOWN, OHIO

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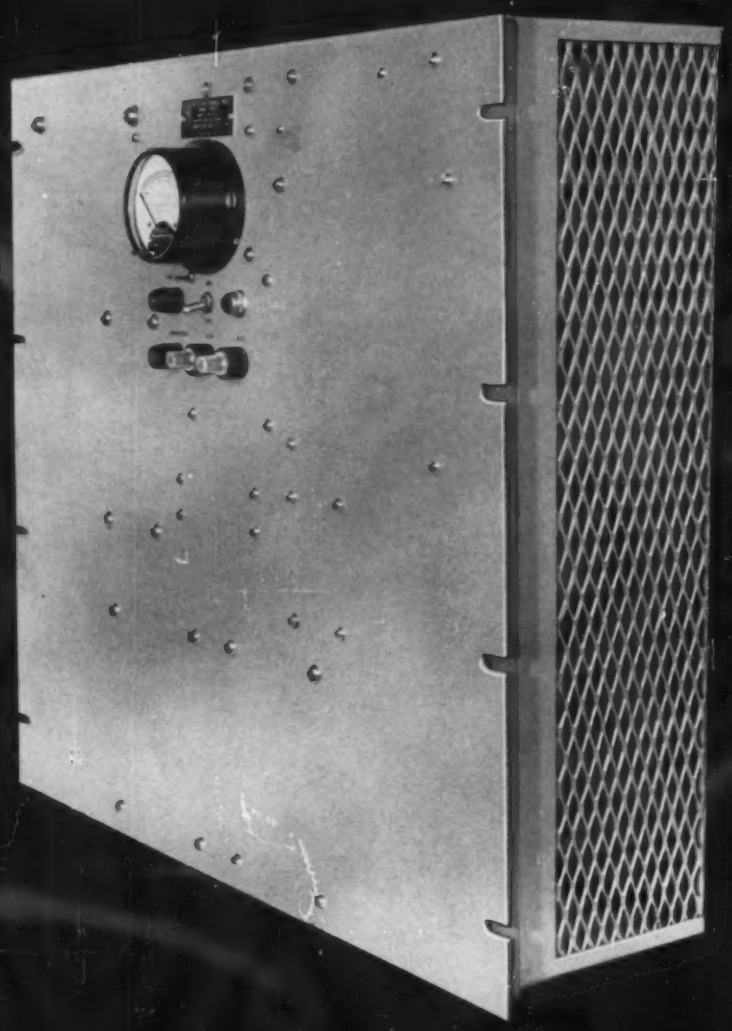
manufacturers of telephones, switchboards and related apparatus since 1907



Introducing... the new Warren Transistor Power Pack

Here, for the first time: a complete power, ringing and tone supply for PBX, PAX, and PABX installations . . . in one compact, economical package!

This Warren Transistor Power Pack is an entirely new design. It combines a battery charger/eliminator with a ringing generator and a dial/busy tone generator . . . a complete, integrated power supply for PBX type installations that will save you money.

Why?

. . . because it packs more power in less space than any power supply available.

. . . because its initial cost is lower than the cost of buying individual components separately.

. . . because it's all transistorized for increased operating efficiency.

. . . because there is no maintenance problem. No moving parts, no "aging" problems — every component conservatively rated for 30-year life.

. . . because it requires no standby equipment where batteries are used in PBX (both ringing and tone generators are d.c. operated).

For complete information, write or call (collect).

SPECIFICATIONS

Models — seven 24-volt models, seven 48-volt models available

Charger/Eliminator capacity —
6–40 amps in 24 v. units
3–20 amps in 48 v. units

Ringer — input, 24 or 50 v. nominal output, 7.5 watts, 100 v. 20 cycles

Dial/Busy tone Generator — input, 24 or 50 v. nominal output, 25 milliwatts, 600 cycles modulated at 120 cycles

Line Load Regulation (used as Battery Charger): ± 1% from 0-100% load. 20 millivolt ripple

Line Load Regulation (used as Battery Eliminator): ± 2% from 0-100% load. 30 millivolt ripple

Dimensions: 23" wide x 8 21/32" deep x 22½" high

Mounting: standard 23" relay rack

WARREN MANUFACTURING WM

First in transistor products for the telephone industry — sold through leading telephone equipment manufacturers.

THE WARREN MFG. COMPANY, INC. Littleton, Massachusetts. Tel. HU 6-3511

IN THE NATION'S CAPITAL

BY FRANCIS X. WELCH, WASHINGTON EDITOR
AND EDITOR, PUBLIC UTILITIES FORTNIGHTLY

Kennedy Wage-Hour Bill passed by Senate. . . . Almost scuttles telephone operator exemption . . . House bill leaves exemption practically unchanged. . . . Conference committee to decide its fate. FPC bars utilities "political" advertising costs as operating charges.

THE SENATE last week finally did what this correspondent has been long expecting. It passed the Kennedy Wage-Hour amendment bill, with not very much change from the form as revised by the Senate Labor Committee. In substance, this not only boosts the present $1.00-an-hour minimum wage to $1.25, but also greatly extends the coverage.

Of special interest to the telephone industry would be the change in the exemption for telephone switchboard operators' wages at exchanges of 750 stations or less. By simply changing the word "exchange" to mean company or system, the Kennedy Bill virtually scuttles the benefits of the amendment for all but the smallest telephone companies. It is estimated that 41,000 switchboard operators would be brought under the law, if the Senate Bill should prevail.

What will finally come of all this? It is too early to say. It will be recalled that the House of Representatives already has passed a $1.15-an-hour minimum wage bill which would leave the small exchange telephone operators' wage exemption practically unchanged.

So what happens now? It looks very much like a conference committee compromise. Both House and Senate conferees will try to settle their differences and produce a bill which will not only be acceptable to both branches of Congress but also to President Eisenhower. He has threatened to veto any wage-hour amendment bill which goes too far.

At this point, however, politics rears its familiar head. With the election campaign coming along fast, the Republicans and Democrats have both got each other over the barrel on the Wage-Hour Law, to some extent. The Democrats are under pressure to pass some kind of a law to boost the minimum wage and extend the coverage, as so long promised to the labor union people. They, in turn, have promised to go all out for the Kennedy-Johnson ticket. Democratic Congressmen would like to do this, moreover, with a bill bearing the name of their candidate, Senator Kennedy, who otherwise has written his name on no major legislation during the present Congress. So, to make good, the Democrats may be disposed to back up to some degree rather than be frustrated by a presidential veto.

The Republicans have an equally delicate political problem. If Ike vetoes the Wage-Hour Bill and there is no legislation at this session, the Democrats will nail the GOP to the barn door, as far as the labor vote is concerned. So, their job is to use the veto threat as a bargaining power in the forthcoming House-Senate conference, but not use it so sharply as to drive the Democrats away from any concessions at all. It's a ticklish deal on both sides.

Among the matters for the conference to decide, of course, is the small exchange telephone operators' exemption. The House left it in and the Senate all but kicked it out. Whether the House conferees will be able to prevail on this one point (out of about two dozen points of disagreement with the Senate) remains to be seen. It does not look too hopeful from the standpoint of those who would like to see the telephone operators' exemption retained as much as possible.

It sometimes happens, however, that these various points of disagreement are played off, one against the other, in such conferences. And the results are often surprising. The telephone exemption might be thrown in as a "make weight" to offset or balance some other point on which the Senate conferees are more disposed to insist. We can only wait and see.

Higher Telegraph Rates OK'd

Last week the Federal Communications Commission approved an increase in telegram and money order rates for Western Union Telegraph Co. The new rates, which averaged an 8 per cent boost, became effective Aug. 17. Cost of a 15-word telegram was upped 5 cents and a 50-word day letter increased 10 cents. Money orders now cost 5 cents more for amounts under $100.

An attempt by the General Services Administration, which represents the federal government's executive agencies, to have the new rates suspended, was rejected by the FCC. GSA contended government message rates would be advanced by about 16.5 per cent instead of the 8 per cent the general public would pay for telegrams. The FCC said that Western Union had shown a pressing need for additional revenue to offset wage increases. The

manufacturers.

company also has filed a proposal to increase press message rates by about 8 per cent, to become effective Aug. 26.

"Equal Time" Suspension Pushed

A key House Republican congressman has voiced doubts about a bill designed to pave the way for Vice President Nixon and Senator Kennedy to hold a series of television debates during the fall presidential race. Representative Bennett (Rep., Mich.) of the House Commerce Committee said he questioned the validity of voting to suspend the equal time requirements of the Federal Communications Law. Bennett said he had "some doubts about the advisability of taking unprecedented action of this kind—leaving to the discretion of the broadcasters whom they give free time to." He emphasized, however, that he had not yet decided whether to oppose the bill. He said he wanted to study it further.

Representative Mack (D., Ill.), another commerce committee member, said he supported the bill. But he said it should not set a precedent which would hamper future attempts to organize new political parties. "I want to be sure we give a fair break to small new parties," Mack said. Chairman Harris (D., Ark.) of the House Commerce Committee, who will be the bill's floor manager, has indicated he expects easy approval. Speaker Rayburn (D., Tex.), had announced that he would bring the bill up for passage on Aug. 22 under a procedure which bars amendments, limits debate, and requires a two-thirds vote for passage.

Political Advertising

What the Federal Power Commission does to the gas and electric utilities under its charge has no effect, per se, on telephone companies. But inasmuch as precedence established by one regulatory commission has traditionally had strong persuasive effect on other regulatory commissions, both the telephone companies and regulatory commissions, at federal and state levels, will be interested in a recent decision of the FPC on the treatment of certain advertising expenses.

On Aug. 17, the FPC ordered a group of 76 electric utility companies to reclassify their accounts to reflect the costs of certain advertisements as miscellaneous income deductions rather than as operating expenses. The commission concluded that the companies' expenditures for eight advertisements which appeared during 1957 in national magazines "are political in character" and should be classified as income deductions. The advertisements were published as part of the "Electric Companies Advertising Program" under the sponsorship of "America's Independent Electric Light and Power Companies."

The proceedings were instituted two years ago when the FPC issued an order questioning the treatment accorded by the 76 companies for the cost of nine of the 26 advertisements involved in the 1957 ECAP program. The companies treated the costs as operating expenses. Cost of the questioned advertising was estimated at $863,130, representing 43.25 per cent of the total cost ($1,995,661) of all copy placed under the 1957 program. In its recent opinion, the FPC held that one of the nine questioned advertisements was not political in nature.

Prior to its order instituting the proceedings, the FPC advised the companies that the advertising expenditures appeared to involve "the presentation of argument in matters of political controversy" and therefore were not properly includable in the operating expense accounts (above the line), normally charged against the ratepayer. Instead, the companies were advised that the expenditures should be classified as income deductions (below the line), normally charged against general corporate income.

In the Aug. 17 opinion, the FPC said that the eight advertisements clearly "deal with a political controversy, the private-public power dispute, and hence involve the presentation of argument in matters of political controversy." The advertisements have as a basic ultimate purpose the influencing of public opinion as to the repeal of existing law, the commission continued, and thus are directly political. In addition, the FPC said, "it is a fair inference that their ultimate purposes include the influencing of public opinion as to such matters as the election of public officers, proposed legislation, and influencing the decision of public officers." Their purposes also may include the influencing of public opinion of proposed ordinances, repeal of existing ordinances, and the approval or revocation of franchises, the commission stated.

The electric companies argued that their proferred evidence fully justified the accounting classification and contended that the proceedings should be dismissed. They contended first that the FPC lacks authority to prescribe an accounting classification based upon the political character of expenditures, or to classify expenditures as income deductions on this basis. Secondly, the companies claimed substantial evidence to support classifying their expenditures as non-political.

Disposing of the first company argument, the FPC held that the Federal Power Act contains provisions sufficiently broad to authorize a system of accounts providing that political expenditures must be charged to a particular account. Classification of the expenses as income deductions is necessary and reasonable in administering the act, the FPC continued, pointing out that their classification as operating expenses would not be consistent with the objectives of utility accounting regulation. In this connection, the FPC noted that the question of whether the ratepayer or shareholder should ultimately pay these expenses must await rate proceedings, because an accounting classification matter of this type does not involve a determination of just and reasonable rates.

The FPC also dismissed the second company argument as "devoid of merit." The commission said the essentially political character of the advertisements was conclusively established by the advertisements themselves, "and so clearly does this fact appear that it is difficult to conceive of any evidence that would justify a different conclusion." Even if the companies' evidence did show that the expenditures have some subsidiary aspect, the FPC said, it would not detract from their fundamentally political character nor justify classifying them in a different manner. The commission said that this also largely disposed of the companies' fourth argument, that it had erred in excluding their proffered evidence.

ECHO I Still Sounding

At this writing, ECHO I, the first communication satellite to be launched in orbit around the earth was still passing a number of tests, and experiments imposed upon it by the United States scientists in charge. A rumor had circulated on Aug. 18 that the 10-story, hollow sphere had sprung a leak and was deflating because of escaping gas. But this was denied the next day by the Lincoln laboratories of the Massachusetts Institute of Technology.

It was admitted that ECHO I had probably been punctured by a number of tiny micrometeorites, or "space debris," during its first 100 cycles around the earth, but it still was said to retain "good sphericity" and was being subject to radio-signal bouncing every time it comes within broadcast reach, according to the National Aeronautic & Space Administration (NASA). By "sphericity," NASA meant that ECHO I was still intact and round, plumped out to its full diameter of 100 feet. Certainly, cosmic dust has drilled tiny holes into and through its cellophane-thin skin of aluminum-painted mylar plastic film, NASA scientists said.

(Continued on page 52)

How telephone companies can extend old concepts to new frontiers with

LINE CONCENTRATORS

by FRANK E. LEE

SOMEONE once said, "There is nothing new under the sun." This statement could be the topic of a rather long discussion, and most likely the conclusions would lead to nowhere. Instead, probably one should say man is continually learning new ways to use old ideas. Perhaps both sides of the "newness under the sun" question would be satisfied with this approach. Using an old idea in a new way is a good way of thinking about line concentrators.

What is a line concentrator?

Service to Remote Areas

A line concentrator is a device that reduces the number of feeder circuits needed between a group of telephones and the central office. In many instances, a concentrator is used to serve subscribers in remote areas with reference to the central office location. A concentrator actually is two sets of apparatus. One set is located at the central office, and one set is located somewhere in the vicinity of the subscribers being served.

The apparatus at both locations is practically identical, consisting of control relays and a crossbar switch. A source of power is required only at the central office unit. Power for the subscriber unit generally is supplied over a feeder pair. A large capacitor or Nickad battery is provided in the feeder circuit at the subscriber unit to store the current for the momentary operation of the crossbar switch.

Operate in Unison

The two sets of concentrator apparatus operate in unison. As a result, a telephone working through the concentrator remains associated with its assigned central office equipment. A good point to keep in mind is that a concentrator is not a remote switching device. A call between two subscribers on separate lines served by the same concentrator must still be connected together at the central office. Two feeder pairs to the central office are required, the same as if the lines were not connected to a concentrator. The advantage of a concentrator is demonstrated when this call is completed and the two subscribers are not using their telephones. The two feeder pairs, called traffic trunks in the concentrator, are available to any of the other subscribers in the concentrator group.

A typical concentrator provides nine traffic trunks for up to 49 stations. Another unit has 18 trunks for 49 stations. A larger concentrator with 20 trunks for 100 stations is also used in some areas. The name "line concentrator" is derived from the fact that a larger number of lines are concentrated on a fewer number of trunks. This is not new. This does not mean that lines connected to a concentrator will receive a poor grade of service. Instead, the reverse is usually true.

Example of Application

Here is a good example of how a line concentrator can improve service in a remote area at a minimum cost:

EXAMPLE: A 26-pair cable to a small community 4½ miles from the central office provides the following service:

	Lines	*Customers*
Individual line, res.	4	4
Individual line, bus.	2	2
Two-party res.	3	6
Two-party bus.	2	4
Four-party res.	9	36
Eight-party rural	2	16
PBX trunk	2	1
Public paystation	2	2*
Total	26	71

*Two locations

A typical line concentrator requires nine traffic trunks and two control pairs to serve a maximum of 49 concentrator lines. The existing lines to be connected initially to the concentrator to provide the 11 feeder pairs are as follows:

	Lines	*Customers*
Two-party res.	3	6
Four-party res.	5	20
Eight-party rural	2	16
Individual line, res.	1	1
Total	11	43

Once connected to the line concentrator, the lines, which originally represented 11 of the existing 26 feeder cable pairs, become 11 of 49 concentrator lines. This would provide 38 additional concentrator lines for use in the community.

Next, consider how service might be upgraded for many of the customers initially connected to the concentrator to provide the necessary traffic and control pairs.

	Concentrator Lines	*Customers*
Upgrade 2-party res. lines to individual lines	6	6
Upgrade 4-party res. as follows:		
Six individual line..	6	6
Three 2-party	3	6
Two 4-party	2	8
No change in initial individual line residence	1	1
No change in initial 8-party lines	2	16
Total	20	43

Advantages Listed

This is a practical example of the benefits made possible with a line concentrator. The use of 9 additional concentrator lines has provided better service for 18 out of 42 customers who had other than individual line service.

Also, 29 concentrator lines are still available. Some of these lines could be used to furnish upgraded service for the 16 four-party residence customers and four two-party business customers who were not initially connected to the concentrator. The remaining concentrator lines could be used for future growth.

The example also shows that line concentrators deserve careful consideration by every operating company looking for a way to upgrade service in remote areas without making costly outside plant additions.

The foregoing example merely shows how a line concentrator would work under a typical set of conditions. The example also raises another question: "How can 49 lines be concentrated on nine traffic trunks and not impair service?"

Ideas Not New

The idea of concentrating a number of subscriber lines to a fewer number of circuits or channels is not new. A manual switchboard is a concentrator because the number of cords on the board is only a small percentage of the number of lines connected to the board. However, the name "switchboard" causes a person to think more of switching characteristics than of concentration of lines.

Concentration of lines is also found in every dial system and in practically every other type of telephone plant facility. The cost of telephone plant would be many times higher if the principle of concentration were not used wherever possible.

Perhaps the greatest chance of misunderstanding a line concentrator is due to the word "concentrator." A name like trunk selector or trunk connector, both admittedly less descriptive, would not give the impression of concentrating a large number of lines to a few circuits. This might make the unit more readily acceptable.

Carries First Switching

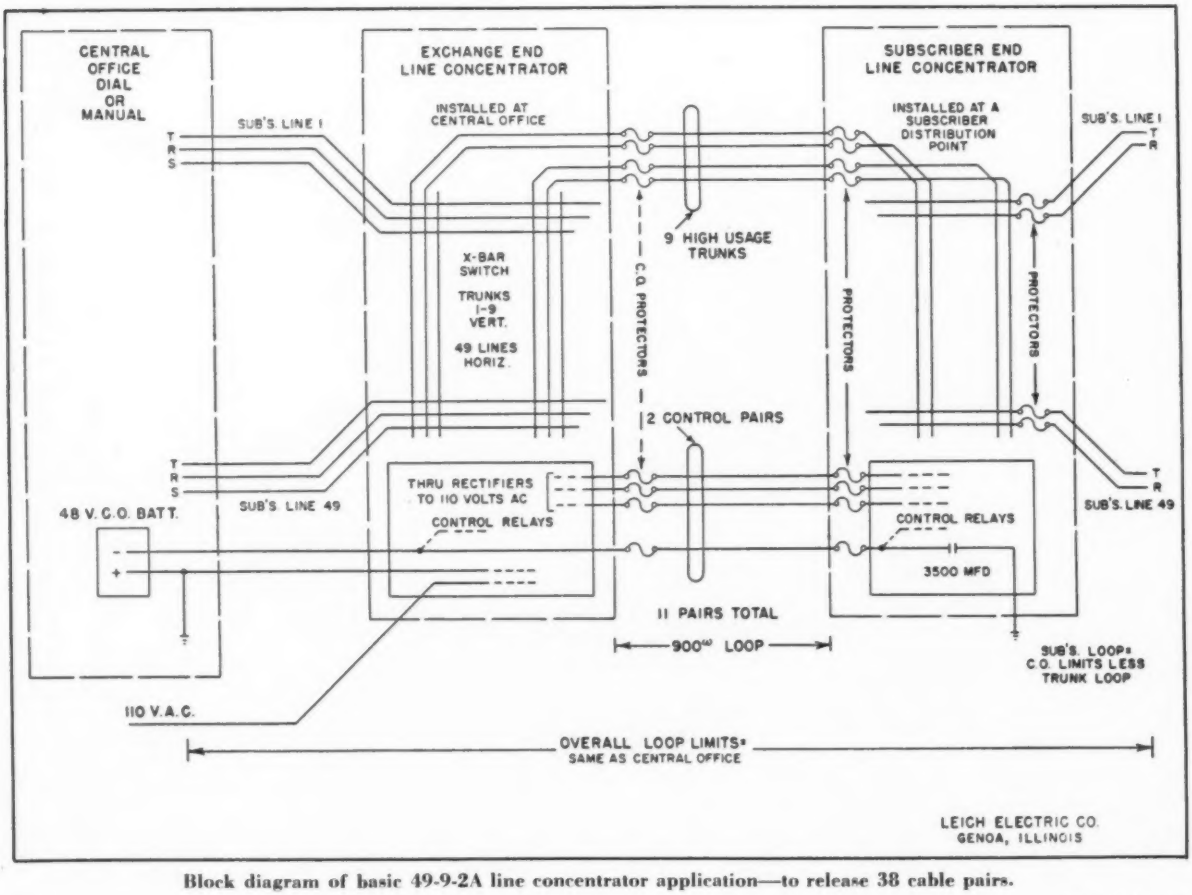
Actually, a line concentrator merely carries the first stage of switching away from the central office to a point nearer the subscriber. However, this simple move requires a little different application of normal principles of traffic use.

A line concentrator serves a relatively small group of customers in a rather sharply defined small geographical area. In most instances, the calling pattern of these customers will differ from the established calling pattern in the office as a whole.

There will also be differences in the calling habits of individual customers in the area to be served by a concentrator. As a result, there is a need to study lines in the group to select those most suitable for line concentration. The objective should be to maintain the same traffic service on concentrated lines as on non-concentrated lines.

Joint Responsibility

Selecting lines to be connected to a concentrator should be a joint responsibility of the traffic, commercial, and plant engineers. Quite obviously, individual and two-party residence lines are most suited to line concentration. Business lines, paystations, and multiparty lines handle a larger number of calls and, thus, are not such likely candidates for concentration. However, if plant distribution can be provided beyond a concentrator to upgrade multiparty subscribers a definite advantage may be gained in class of service and rates of return by spreading the multiparty service over more than one concentrator line.



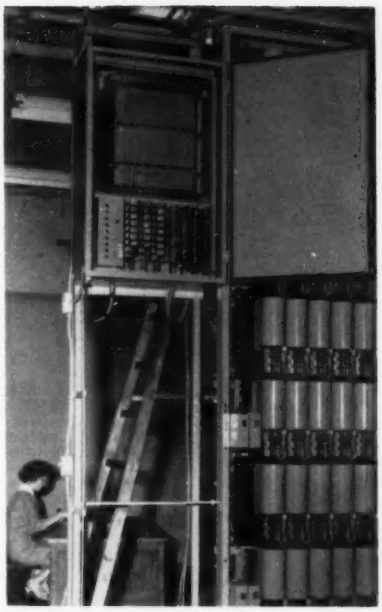
Block diagram of basic 49-9-2A line concentrator application—to release 38 cable pairs.

Areas in which there is a decided community of interest (calling between lines in the community) also are not best suited to line concentration. The reason is, as mentioned before, that two traffic trunks to the central office are required when two lines connected to the same concentrator are connected together. A broad understanding or knowledge of areas, in which a high community of interest would not usually be found, is helpful in selecting a location for the application of a line concentrator. Typical locations where the community of interest generally is low are:

(1) New residential developments
(2) Large apartment buildings
(3) Summer resorts

Selection Has Advantages

Selecting a location or a group of customers where there is a low community of interest has advantages. Actually, the presence of a fairly high community of interest would not necessarily rule out the use of a line concentrator. The double usage of traffic trunks to handle an intra-group concentrator connection creates a higher probability of failure to set up a connection than for normal traffic at the same equipment load. However, the probability of finding all trunks busy is not changed to any great extent even if 50 per cent of the concentrator traffic is confined to intra-group calls. Only a minor adjustment in concentrator capacity rating is necessary because intra-group calling rates as high as 10 per cent are quite unusual.



Concentrator unit installed on relay rack in central office.

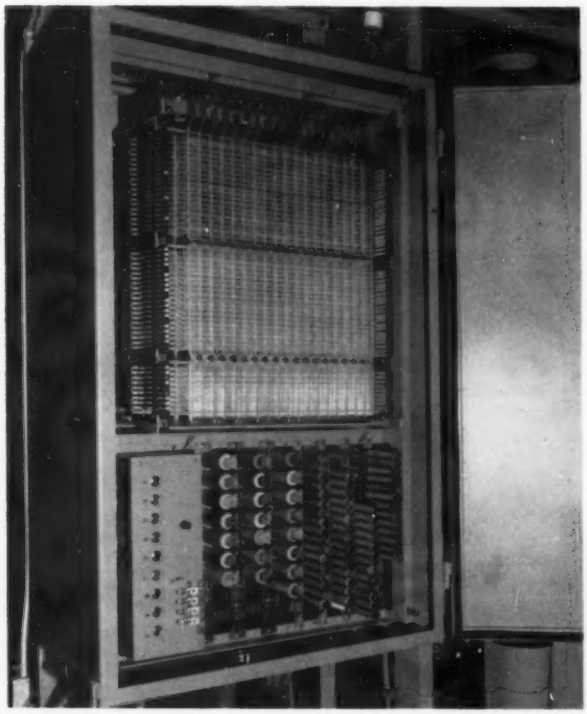
Selection of a 49-line, 18-trunk concentrator would be preferred to derating a 49-line, nine-trunk concentrator to compensate for an expected high community of interest calling rate. The nine additional trunks in the 18-trunk unit reduce the probability of delayed calls. A concentrator with a larger trunk capacity also has definite advantages where higher-use lines will be connected to the concentrator.

Temporary Service

Fairs, carnivals, and construction projects are also good candidates for concentration, if the line selection is made primarily from residence customers in the neighborhood to free lines for the temporary project. Service requirements in this category are temporary, which serves to emphasize the cost reducing advantages of a line concentrator.

The mere fact that a community is long established, or well established, also does not automatically rule out the use of a line concentrator. There always is a wide variance in the telephone usage of customers in the area. Some customers use their telephones considerably more than others. The low-use customers can be most efficiently served by a concentrator.

Perhaps the biggest problem is how to use a concentrator to full capacity without making traffic usage studies on selected lines and moving them in and out of the concentrator group at periodic intervals. Ideally, elimination of all traffic studies would be most advantageous. However, this may not always be necessary to prove in a concentrator, because the advantages of line concentration are of such magnitude under various conditions that an extensive traffic use study may be warranted.



Close-up view of central office concentrator unit.

Connected on Gradual Basis

Lines can be connected to the concentrator on a more or less gradual basis if there is a question of how much traffic the concentrator will carry. Engineers have suggested that a concentrator be loaded gradually until a point is reached where only an occasional ATB (All Trunks Busy) registration occurs. A recommended average loading for the busy hours of the busy season is to stay in the range of 100 to 120 CCS (Hundred Call Seconds) unless experience shows that more than 110 CCS can be carried without exceeding service objectives or ATB limits established for the central office. A typical objective is that ATB registrations should not exceed seven per week. In this instance, a week is five business days in the concentrator class busy hour.

The abbreviation CCS stands for Hundred Call Seconds and is determined when call holding time is expressed in seconds and divided by 100. Holding time is the length of time that a traffic path or channel is engaged for a call. Holding time may vary for each

call. As a result, this is not a uniform factor. Generally the holding time for a central office, or a type of apparatus, is the average holding time of a large number of calls taken on a sampling basis.

Example Cited

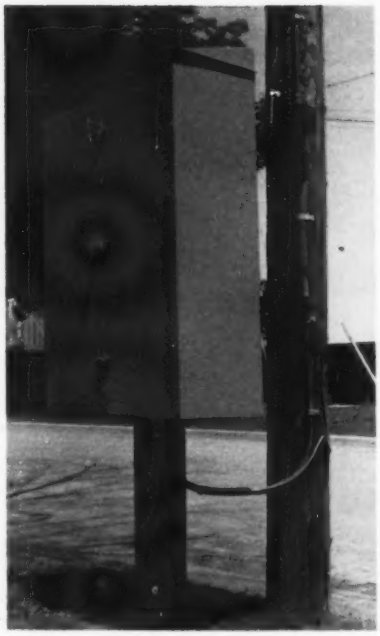
If nine traffic trunks were used at their ultimate capacity for one hour, the call load would be 324 CCS. This is determined by multiplying: 60 seconds x 60 minutes x 9 trunks to arrive at 32,400 call seconds. This, divided by 100, is 324 CCS. Thus, a traffic load of 110 is approximately one-third of ultimate capacity. This margin of 3 to 1 is necessary to maintain the probability that only one call in a hundred may be delayed during the busy hour. Generally, this is expressed as a decimal. For example, P = .01 is a simplified way of saying that the probability of a customer experiencing a delay during the busy hour is once in 100 calls. P = .001 extends the probability of delay to once in 1,000 calls, and P = .0001 is once in 10,000 calls.

The more remote the desired probability, P = .0001 or P = .001 as compared to P = .01, the closer the amount of equipment or trunks provided should be to the number of calls offered in the busy hour. Errors in this direction can be as costly in dollars as errors in not providing enough equipment are costly in customer opinion and value of the service. As a result, a compromise must be made between how much money should be invested in equipment and the dollar savings to be obtained by allowing some calls to be delayed by all trunks, or all paths being busy. In the final analysis, facilities must be provided in sufficient quantities to give service satisfactory to the customer—as measured by his standards—at a price which he will accept as reasonable.

Cost vs. Service Objectives

The problem of balancing costs with service objectives is a part of all telephone service planning. For this reason, the same approach can be used in planning a line concentrator installation. Caution should be used, however, in interpreting and using existing data. The smaller group of customers covered by a line concentrator may have different calling habits, shorter or longer holding time patterns, and a different busy hour than for the central office as a unit.

Care should also be taken to keep in mind the ultimate service objective of providing a service that is satisfactory from the customer's viewpoint. In this respect the customer considers such things as:



Subscriber unit of concentrator mounted on pedestal adjacent to feeder distribution pole.

(1) Speed of connection.
(2) Frequency of connection on first attempt.
(3) Accuracy of connection.
(4) Quality of transmission.

Concentrator Measures Up

Experience has shown that the service of customers connected to a line concentrator can measure up to these rigid standards. In fact, cost and service objectives may be more readily realized, in specific instances, by using a line concentrator than by any other means.

Intermix Concentrator Lines with Direct Cable Pairs. Intermixing of concentrator lines with direct cable pairs is highly recommended. Lines carrying a high volume of traffic—PBX trunks, paystations, multi-party lines, and similar lines—should remain, wherever possible, on direct feeder pairs. These lines are generally in use so much that the line is busy most of the day. In most cases, customers can be connected to the concentrator lines on a selective basis—high use customers on direct lines, and low use customers on concentrator lines.

Even in these instances, conditions may warrant making an exception to the rule. For example, residence usage in a given community may be high during the evening hours but rather low in the day time. Certain business lines may be busy during the day with little or no traffic during the night and evening hours. A line concentrator, used under these conditions, would result in very efficient use of the traffic trunks during most of the hours of the day.

How to Load a Line Concentrator. As discussed previously, the best way to load a line concentrator is to select lines to be connected that will save the greatest number of cable pairs without overloading the call-carrying capacity of the concentrator. The concentrator can be loaded on a progressive basis if traffic use data is not available. This will permit gradual loading of the concentrator until the point is reached where there is only an occasional ATB registration.

Installation Plan Suggested

A good plan has been suggested for placing the concentrator in service as follows:

(1) Connect nine to 12 lines the first day so that the operation of the concentrator and the service given these customers can be observed. These generally include the customers who must be connected to the concentrator to provide the necessary traffic trunks and control pairs.
(2) Increase the concentrator load in a series of steps, as service demands require.
(3) Continue the loading as long as satisfactory service levels are maintained.
(4) Increase the time interval between the loading steps as the full concentrator load is approached. This allows time for the observation of changing traffic use patterns through the concentrator.
(5) Leave one or two feeder pairs spare, whenever possible, to permit removal of high usage lines. This will avoid interchanging lines assigned to the concentrator and lines working over direct feeder pairs.

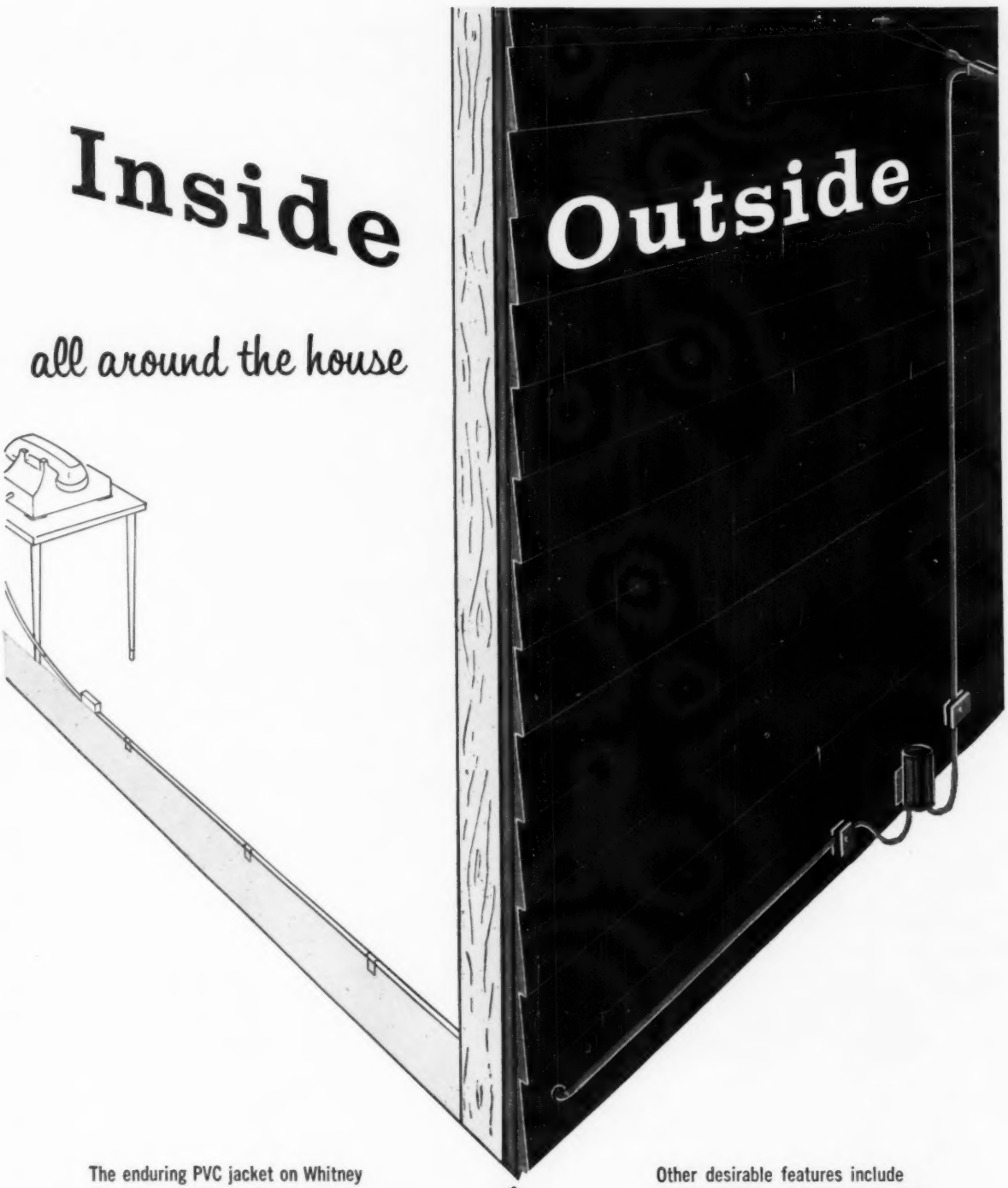
There are many places where a line concentrator may prove economical. A typical list of these locations is as follows:

(1) Providing service in a new residential area where feeder pairs are limited.
(2) Serving an apartment building when there is a lack of feeder pairs to supply the desired service.
(3) Furnishing service for unusual demands of short duration. A typical instance is a construction project or fair. Facilities may be provided by connecting existing lines in the area to a line concentrator.
(4) Deferring outside plant construction projects because of possible relocation of lines caused by road construction or other uncompleted activities affecting right-of-way.
(5) Postponing major plant additions awaiting observation and analysis of development progress.
(6) Delaying need for expensive outside plant relief. Examples are deferring the addition of a submarine cable, conduit construction, or similar costly outside plant addition.
(7) Deferring establishment of a

(Continued on page 26)

Inside

all around the house



The enduring PVC jacket on Whitney Blake's new station wire makes it ideal for outside use. Its pleasing beige tone harmonizes with any inside decoration assuring subscriber satisfaction.

Other desirable features include PVC insulation; twisted conducters; convenient knock-out cartons with length clearly marked.

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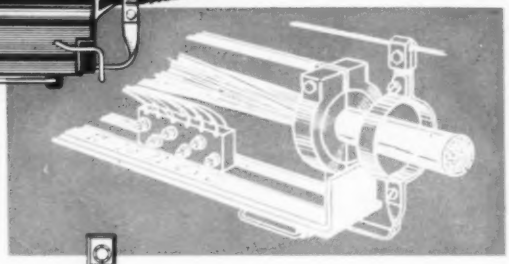
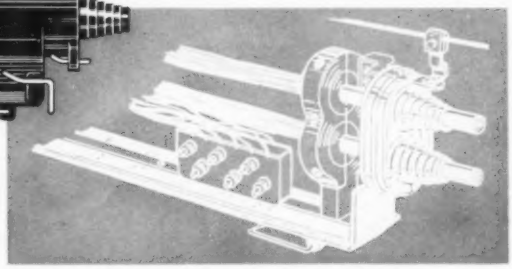
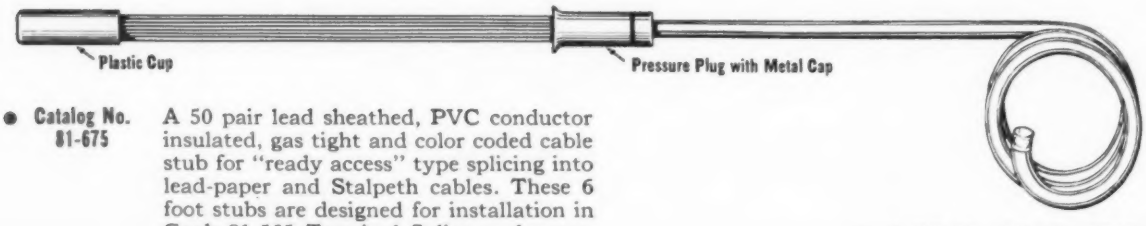
They feature easy accessibility, straight through and branch splicing, and are easily re-opened for re-arranging drops or for maintenance operations.



- **Catalog No. 81-250** — A heavy duty enclosure 28 inches long for plastic cables from 1 inch to 2.2 inches in diameter. The unit is furnished complete with all the necessary hardware.

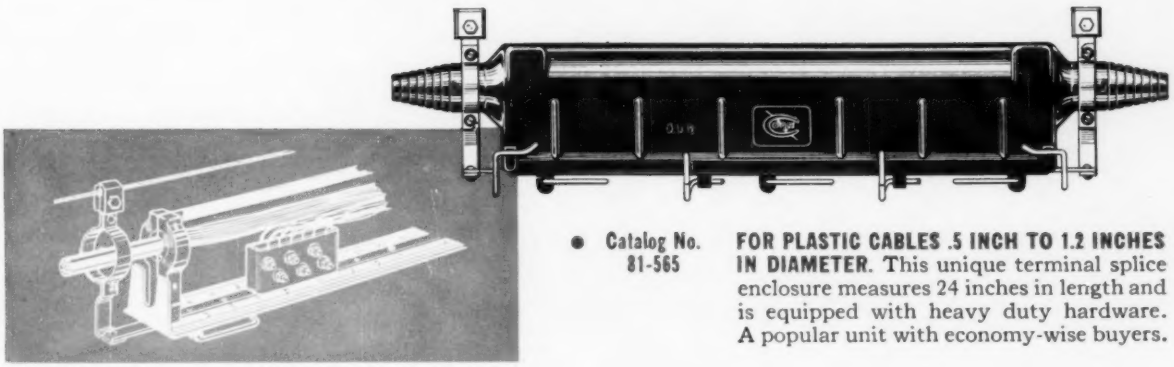


- **Catalog Nos. 81-417 81-418** — These units measure 25 inches in length and are also heavy duty enclosures. 81-417 is for main and branch cables .5 inch to 1 inch diameter, and 81-418 is for 1 inch to 2.2 inch plastic cable diameters.



- **Catalog No. 81-675** — A 50 pair lead sheathed, PVC conductor insulated, gas tight and color coded cable stub for "ready access" type splicing into lead-paper and Stalpeth cables. These 6 foot stubs are designed for installation in Cook 81-565 Terminal Splice enclosures.

- **Available Through Your Local Distributor**



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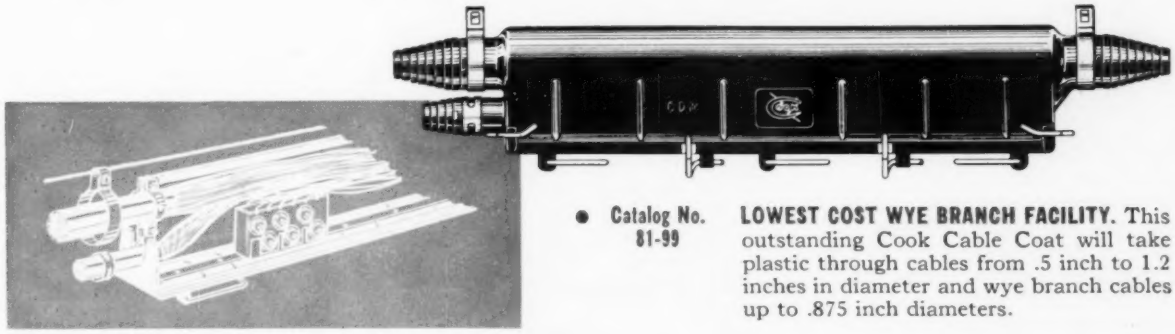
FOR PLASTIC CABLES .5 INCH TO 1.2 INCHES IN DIAMETER. This unique terminal splice enclosure measures 24 inches in length and is equipped with heavy duty hardware. A popular unit with economy-wise buyers.



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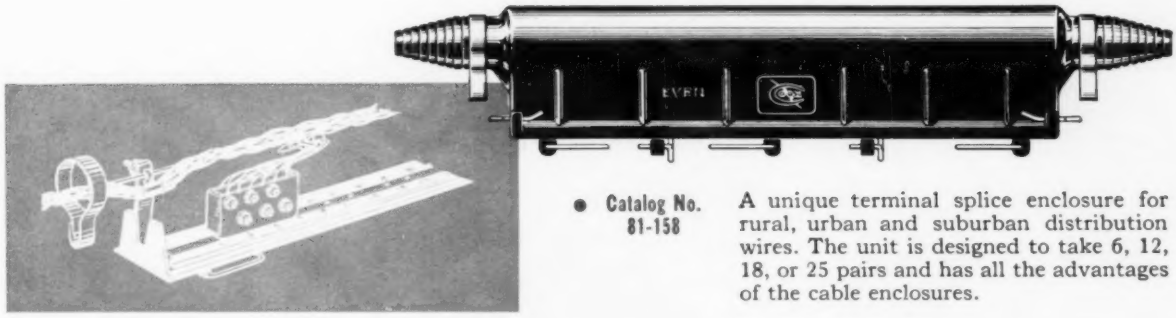
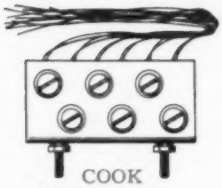
LOWEST COST WYE BRANCH FACILITY. This outstanding Cook Cable Coat will take plastic through cables from .5 inch to 1.2 inches in diameter and wye branch cables up to .875 inch diameters.



● Catalog No. 81-158

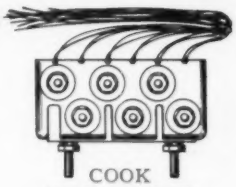
A unique terminal splice enclosure for rural, urban and suburban distribution wires. The unit is designed to take 6, 12, 18, or 25 pairs and has all the advantages of the cable enclosures.

COOK ALSO OFFERS A FULL LINE OF TERMINALS AND LOADING COILS



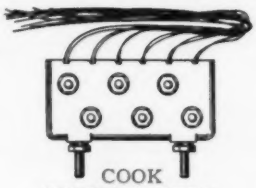
COOK PROTECTED TERMINAL BLOCKS

Furnished in 3, 6, and 16 pair with 41-285 Minigap .005″ gap or 41-610 Minigap .010″ gap.



COOK WASHER-GAP TERMINAL BLOCKS

A 6 pair protected terminal block that can be ordered with or without leads.



COOK UNPROTECTED TERMINAL BLOCKS

A 6 pair unprotected terminal furnished with or without leads.

COOK LOADING COILS

Hi-Fi loading coils. Furnished in 1 to 25 coil sizes, with REA approved color coded leads.

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new central office in an area where growth is relatively slow and additional study of various factors might be profitable.

Placing of Concentrator Units

Installing the Central Office Unit. As a general rule, the central office unit of a typical line concentrator is designed to mount on a standard 23-inch relay rack or relay bay. The unit can also be wall mounted. A relay rack mounting, of the two, usually is preferred. However, these units, in most instances, do not require rear access for maintenance. As a result, a wall mounting may have advantages if relay rack space cannot be made available.

Locating the Subscriber Unit. Primarily the location for the subscriber unit should protect the line concentrator from the weather and from damage or idle tampering. Such a location would be on a pedestal or pole, in a building, or even in a dry basement. A location in a building is most desirable because working conditions are better in inclement weather and because temperatures can be maintained at a more uniform level.

A building location, however, is not a controlling factor because concentrators have been installed outdoors on poles and pedestals with highly satisfactory results. A low level outdoor mounting—out of the way of pedestrian and vehicular traffic—usually is most advantageous. The low level mounting can be reached conveniently from a ladder. This eliminates the need of providing a rather costly balcony and railing higher on a pole.

Weather Protection Needed

Some sort of housing or weather protection is required when the subscriber unit is mounted outdoors. One line concentrator manufacturer has designed a weatherproof cabinet specifically for this purpose. This cabinet has two L-shaped cover sections hinged at the back of the mounting. The two cover sections, in the closed position, meet at the center to form the two sides and the front of the housing. The sections, being hinged at the rear mounting, swing out and back to provide convenient access to the front and sides of the concentrator equipment.

The concentrator housing need only be weather tight. Absolute sealing, like hermetic sealing, is not necessary and should not be used. In this respect some sort of temperature control may be necessary in extremely cold areas. Generally, this can be furnished by placing a lighted 50 or 75-watt bulb or small thermostatically regulated heating unit inside the housing.

A cross-connecting terminal should be provided with the subscriber unit. This terminal facilitates connecting the concentrator to the central office traffic trunks and to the subscriber line distribution plant. The cross-connecting terminal also adds to the flexibility of the completed installation because subscriber lines can be more easily added to or removed from the concentrator.

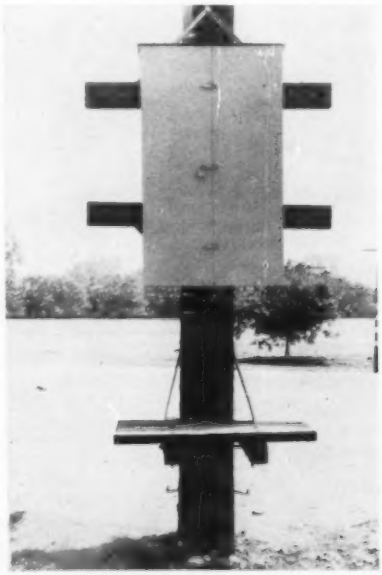
Stub Cable Used

Many telephone companies connect a stub cable to the concentrator. The cable may be a few feet long or up to two or three spans in length. In some instances, the cable may be buried between the cross-connection terminal and the concentrator location. The longer stub cables enable the concentrator to be located at some distance away from the cross-connecting terminal when a remote location is more desirable.

The use of a stub cable and cross-connecting terminal also has a definite maintenance advantage. The trunk, subscriber line and control terminals of the concentrator can be connected permanently to the stub cable. All cross-connections between these terminals and the feeder and distribution pairs can be made at the terminal. This eliminates the need to open the concentrator housing except for maintenance reasons.

Subscriber Unit Installation

The ease and simplicity of the subscriber unit installation also adds to the flexibility of a line concentrator. A good example is the ease with which the subscriber unit can be moved as the need and progress of permanent outside plant construction requires. The central office unit can be left in place because cross-connection or jumper rearrangements usually are the only changes needed when the subscriber unit is moved.



Subscriber concentrator unit mounted at base of feeder terminal pole. The weatherproof housing is locked to prevent tampering.

Connecting central office and subscriber lines to the concentrator is little different from connecting a non-concentrator line. The subscriber lines are assigned and connected to specific terminals in the subscriber concentrator unit. The central office equipment or circuits, normally associated with these subscriber lines, are connected to identical terminals in the central office unit. For example: An individual residence line may be assigned to line terminal number 27 in both units. Another line, perhaps a two-party residence line, might be assigned to terminal 28 in each unit.

Operation of Concentrator

The operation of a line concentrator is also easy to understand. Assume an incoming call is being terminated for the individual line assigned to concentrator line terminal number 27 and the line is idle. The concentrator units, operating in unison, would instantly connect a trunk, pre-selected in rotation, to terminal number 27. The customers never would be aware the call was routed through a concentrator.

An area served by a line concentrator will never be isolated by a loss of commercial power or a failure in the dc supply to the concentrator if the central office equipment remains in service. Idle trunks are pre-selected on a rotation basis for the next call. The remaining trunks remain connected to the subscriber line last using the trunk. Assume the call originally made to the individual line connected to concentrator line 27 is completed, and the station is idle. The trunk used for the call remains connected to terminals 27. The trunk will remain connected to these terminals until pre-selected, in rotation with the other idle trunks, awaiting the next call through the concentrator. The trunk connected to the individual line on line terminal 27 could be reused a number of times by this party before being pre-selected by the rotation circuit.

Number of Units Can Be Used

Another factor in the pre-selection process is the trunk next in the rotation or preference circuit must be idle. Otherwise the preference circuit picks the next idle trunk in the group. Thus, although no new trunk selections can be made during the duration of the

(Continued on page 50)

BY PAUL E. MURPHY, ELECTRONICS EDITOR

NEW NOISE MEASURING SET

THE PRESENT and future of the art of telephony necessitates low noise levels on the various communications circuits. "Talking machines" as used in data transmission, and ordinary human beings as users of telephonic communications, will no longer tolerate noisy circuits. Thus, it is necessary to reduce noise on existing facilities and design the noise out of future proposed facilities.

In determining whether or not our noise objectives are being met by design and being kept through maintenance, extensive use is being made of noise measuring sets of one type or another.

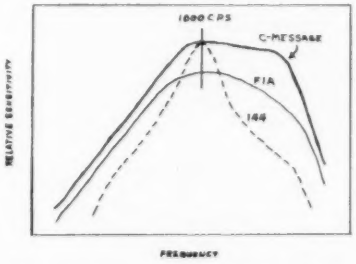
Many of these instruments have incorporated in their design, "weighting networks," referred to as 144 and F1A. They were designed to take into account the relative frequency characteristics of earlier telephone plant and the human ear; thus indications on the meter associated with the set were indicative of the amount of interference to which a person would be subjected.

With the advent of the newer type telephone instruments of the 500 series, or their equivalent, which are now in general use, a new type weighting network is required. This new weighting network has been designed and incorporated in a new type instrument developed by the Bell Telephone Laboratories and manufactured by Western Electric Co. The new network is referred to as "C-message" and incorporated in the 3A Noise Measuring Set.

The 3A Noise Measuring Set is completely transistorized and is, thus, quite compact (7 inches by 11 inches by 19 inches). The weight of the unit is approximately 14 pounds, a far cry from some of the earlier noise measuring sets.

The weighting to be used in conjunction with the noise to be measured is determined by selecting a proper plug-in weighting network. There are now four types of networks included in two packages and, by proper orientation of the network in the test set, any one of the four types of networks is inserted into the circuitry of the noise measuring device. The weightings to be applied to the circuitry are F1A, 144, C-message and a weighting associated with radio broadcast service. The "C-message" weighting is, of course, a new term being introduced into the field.

When original 144 weighting networks were installed in noise measuring sets, measurements on these early sets were expressed as so many dbrn (decibels above reference noise) above a "reference power." The reference power was taken to be a 1,000 cps at 10^{-12} watts or 90 db below 1 milliwatt. Sometime later, the (F1A) type of telephone made its way into the telephone plant and having somewhat different characteristics it created a necessity for development of the F1A weighting network.



Comparison of the characteristics of weighting networks employed in the 3A Noise Measuring Set.

Because of these new characteristics, the results of many tests made on various kinds of noise dictated a new reference, dba (decibels adjusted); thus measurements were referred to as being so many dba above a "reference power," or simply dba. This new "reference power" was adjusted to be a 1,000 cps at 5 db above 10^{-12} watts or −85 dbm.

With the new type "C-message" weighting, it was expected that still a new reference would be derived, but Bell lab engineers decided to go back to the original reference. Since, however, the new weighting characteristics will give different answers than the dbrn associated with the 144 weighting, the new readings will be designated "dbrn—C message."

FCC RULES AND REGULATIONS

THE FEDERAL Communications Commission requires that licensees and operators of radio station facilities maintain copies of and have a knowledge of sections of its rules and regulations governing the type of service under which operation is authorized. At the same time, parties interested in radio station licensing must have knowledge of the rules and regulations in order to properly file various applications such as new, modified, or renewal of radio station instrument licensing.

The FCC has recently inaugurated

a new system for the issuance of its rules and regulations. The various parts of the rules and regulations were previously issued as separate parts, whereas the parts are now to be grouped into 10 volumes and are to be sold by the Superintendent of Documents, Washington 25, D. C.

Additional ordering information may be obtained by directing inquiries to the Superintendent of Documents and requesting Price List 36, August 1960 edition.

CABLE CARRIER SYSTEMS

Part 2

THIS is the second of three installments of a discussion on cable carrier systems. In the first installment which appeared in this department in the July 30 issue, a discussion as to the needs of a short-haul cable carrier system and some of the engineering considerations and terms frequently associated with these systems were presented.

In this installment, a discussion will be presented on the actual layout of a short-haul cable carrier system. The recently developed Kellogg K-24 system will be the basis for the discussion.

As illustrated in the accompanying layout schematic, the facility from Wooster (East Terminal) to Orrville (West Terminal) is 64.2 KFT and is 19-gauge toll quad cable. Assuming that satisfactory cable pairs are available between these two terminals, as was previously discussed, repeater sections adjacent to terminals may have as much as 25 db loss at the highest frequency, and sections between successive repeaters may produce as much as 28 db loss at these same frequencies and yet provide suitable telephone grade circuits.

Even if noise or crosstalk on some channels should exceed imposed limits, certain optional devices may provide satisfactory transmission. These devices are called "Sonads," a compandor-like device.

As was discussed in the first installment, facilities are generally engineered on a quite conservative basis, first, so as to allow ample margining for future moves due to unforeseen roadway construction and, secondly, it is not always possible to install repeaters at certain limiting points. For these, and many other reasons, repeater sections are generally designed shorter than their maximum limits. In the Wooster-Orrville facility an attempt was made to locate repeater points at final splices and load sections. As is to be noted later in this discussion, repeater sections are much shorter than need be. Why was such a design followed?

(1) First of all, the repeater housing includes a stub cable which is spliced into the main cable. By installing the repeater housing at load points it is possible, where several systems are expected to be installed, to remove the existing load coils, splice these pairs into the repeater housing and install special card mounted loading coils, which plug into the repeater housing. As the future systems are added, it is only necessary to "unplug" the coils and insert the repeaters.

(2) Possibilities of road moves or other modified construction without the necessity of completely re-engineering the system.

(3) Reducing the possibility of any would-be effects from impulse type noise on potential data transmission.

As will be observed by referring to the circuit layout schematic, the values of all pads and equalizers are specified, the purposes of which were covered in a preceding installment. In determining the value of the pad, it is only necessary to determine the flat loss factors at the highest frequency, multiply the factor by section length, and subtract this value from the permissible flat loss. The flat and slope factors were examined previously, but are stated below for convenience. For 19-gauge-toll-quad cable, they are as follows:

Flat Factor	Slope Factor
2.12	1.36

As an example, let us examine the first repeater section leaving the Wooster terminal. It is to be observed that there are 5,898 feet or 5.9 kilofeet of 19-gauge toll quad cable. If the 5.9 kilofeet of cable is multiplied by the flat loss factor, we obtain 12.5 db flat loss. By subtracting this value from the 28 db permissible flat loss, a pad value of 15.5 db should be specified. However, an additional .5 db was attributed to central office wiring and, further, pads are only obtainable in 2 db increments. If desired, slight variances may be algebraically added and this difference made up at some point in the facility.

The value of the equalizer may be similarly determined. As an example, let us examine the same section from the standpoint of slope. In this instance, we multiply the 5.9 kilofeet times a factor of 1.36 and arrive at a section slope of 8 db. This, then is the value of the equalizer. As in the case of the pad values, equalizers are likewise available in 2 db increments. Again, any variances in design may be "taken up" at some point in the facility.

The flat and slope losses of each tentative repeater section are each calculated as in the preceding examples and from these computations various pad and equalizer values are determined.

As an assist in completing circuit

layout cards or other forms of plant records, this same circuit layout schematic may serve as a worksheet for assigning levels, as is illustrated. By assuming the specified terminal output and by adding losses and gains, a diagram similar to that shown may be obtained.

Repeater Considerations

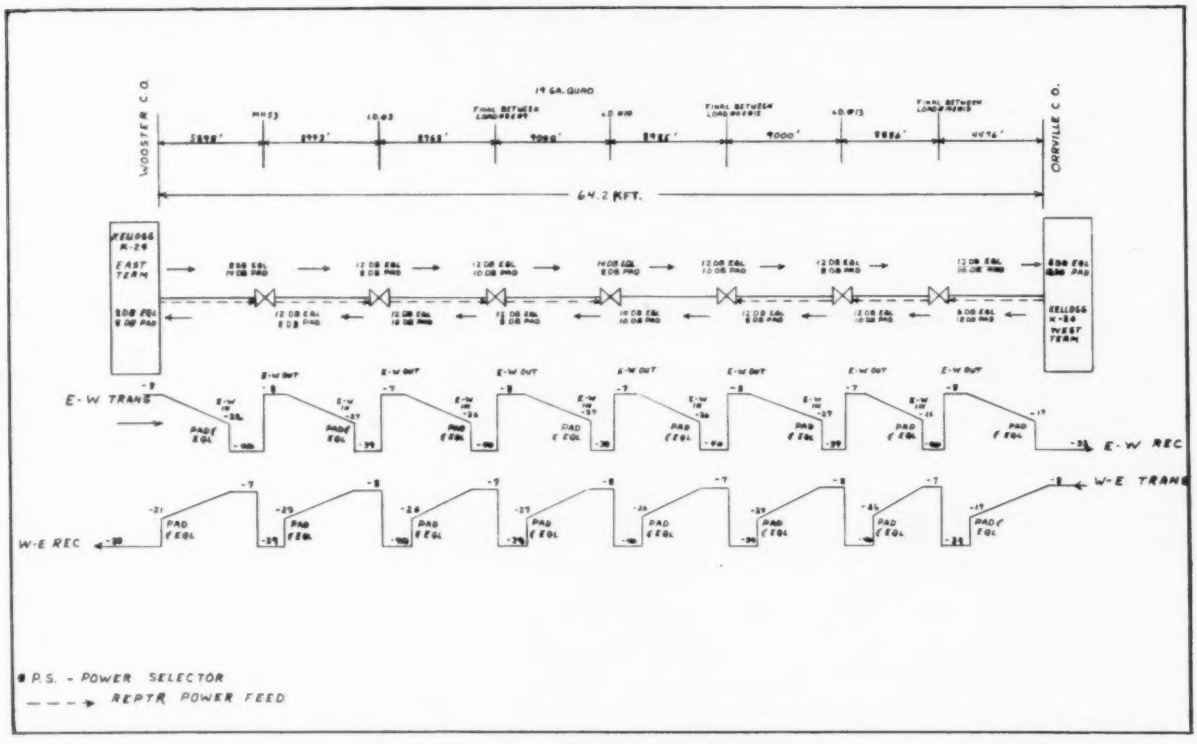
The repeaters are completely transistorized and as a result little power is consumed.

Power for the repeaters is normally transmitted from end terminals over the same cable pairs utilized for carrier transmission. The repeaters are fed in a series arrangement and require approximately 56 ma. A total of five repeaters may be powered from each terminal if + 130 volt is applied on one pair and — 48 volt to the other pair. If both + 130 volt and — 130 volt sources are available, a maximum of seven repeaters may be fed from one terminal.

In the Wooster-Orrville system, there is a total of seven repeaters with the mid-point repeater being of the regulated type and all others of the non-regulated type. As shown on the schematic, four repeaters obtain power feed from the Wooster terminal and three repeaters obtain their power from the Orrville terminal.

Both regulating and non-regulating type repeaters are available with non-regulating repeaters being used at most locations. Regulating repeaters are normally provided at every third or fourth repeater point depending upon whether the cable is aerial or underground. "Variations of + 10 to — 5 db in the received input level are reduced so that the output level does not vary more than ± 1 db. The repeaters regulate on a high level pilot which is transmitted from each terminal.

In our next article, Part 3, we will discuss system installation and system testing of the K-24 short-haul cable carrier system.



Schematic layout of short-haul cable carrier system.

ULTRASONIC JOINING

A NEW ULTRASONIC device capable of joining together materials previously considered extremely difficult or even impossible to join, has recently been developed by Raytheon Mfg. Co.

The device emits high frequency waves at 25,000 cycles per second to join such materials as aluminum, silicon, germanium and ferrites. These materials are considered difficult to join as the result of an oxide film which forms on their surface.

In operation, the ultrasonic device, by emitting high frequency waves, excites the molden solder on the surface of these materials and, at the same time, breaks down the oxide film.

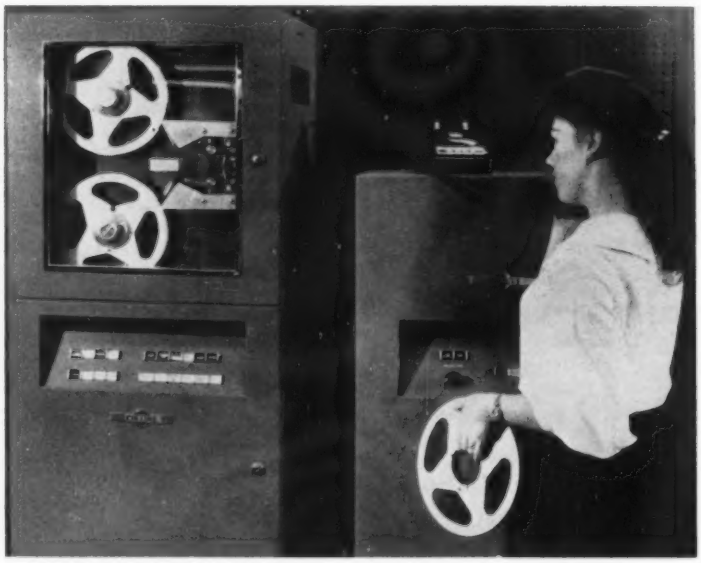
It is said that the generator converts a 60-cycle commercial current into .001 strokes at 25,000 cycles per second. These rapid strokes are then transmitted to a tool tip of the device, which then excites the molten solder on the surface of the material. It is through this method that the oxide of the material is broken down and a weld performed.

The Raytheon unit is rugged and portable, weighing approximately 45 pounds. It is designed to operate on a power input of 115 volts ac.

DATA TRANSMISSION

THE NATION'S first data communication networks for transmitting business, scientific, military, and industrial information over telephone lines at the highest speeds ever achieved with commercial-type equipment have been placed into operation, Collins Radio Co. recently reported.

One of the networks uses a magnetic tape transmission system for inventory control between two Army Signal Corps supply points 650 miles apart.



A new data communications system being used by the Army Signal Corps for inventory control. The system reportedly operates at speeds up to 3,000 words per minute.

The speed with which the system operates is 300 characters per second, equivalent to 3,000 words per minute.

The Army Signal Corps' tape transmission system links the Signal Supply Agencies' headquarters and national inventory control point in Philadelphia, Pa., with the Lexington, Ky. Army Signal Depot. Each day a reel of tape from a computer at Lexington which has recorded the previous day's supply transactions is transmitted via telephone. A 2,400-foot reel representing some 25,000 transactions can be transmitted in two hours. The supply data is then fed to a large computer which updates inventory records and produces reports for use by purchasing officers.

It was stated that prior to installation of the system, punched cards requiring 8-10 hours for transmittal of information and involving several manual operations were employed as a means of conveying the information.

ELECTRONIC BOOKS AND HELPS

Training Aids

MANY OF THE NEW electronic devices being introduced to the telephone industry are being constructed of solid state devices. If these de-

vices are to be properly maintained, some fundamentals as to the theoretical and practical aspects must be understood.

Quite often, to sit down and read a book on such subjects leaves a lot of loose ends hanging; then, too, much of the subject matter is soon forgotten. In instances where theory and practice can be combined, a more complete and exacting knowledge can be acquired and, moreover, it can be retained over a greater period of time.

Following this line of reasoning, RCA has recently developed a transistor training kit. The kit enables new technicians, as well as those technicians experienced in vacuum tube circuits, to learn transistor techniques by completing pre-wired circuits on its "jackfield."

Using a diagram template affixed to the jackfield, the technician can mount solid state devices at various indicated positions to complete operating circuits quite often employed in radar, radio, electronic computers, and other transistor applications.

Measuring 9 x 12 x 5 inches, the training unit weighs 4½ pounds and utilizes self-contained batteries as a power source. Price of the kit is $150.

For further information, contact T. A. Bradshaw, Industrial Electronics Products Division, RCA, Camden, N. J.

Microwave Engineering

MANY technicians and engineers responsible for the planning and installation of microwave radio and multiplexing systems have expressed a need for some kind of consolidated digest of microwave engineering considerations to serve as a guide in laying out these systems.

Recognizing this necessity, Lenkurt Electric Co., a subsidiary of General Telephone & Electronics Corp., has recently published a manual entitled "Microwave Path Engineering Considerations—6000 to 8000 MC."

In preparation of the manual, it has been assumed that the reader is familiar with some of the problems involved with multi-channel, point-to-point communications, and that he has equipped himself with a basic knowledge of radio and multiplex equipment.

This manual may be purchased through Lenkurt's distributor, Automatic Electric Sales Corp., Northlake, Ill. Price, $3.00.

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THE Plant Man's Notebook

BY RAY BLAIN, TECHNICAL EDITORIAL DIRECTOR

BOTH THE INDEPENDENTS and the Bell System are constantly making improvements to increase the dependability of telephone service. Thirty years ago, Bell System customers reported trouble with their service on the average of once each year. Now it is on an average of once every two years, and in a third of the troubles reported last year, the customer's service was discovered to be working satisfactorily when checked out by the repair service. This means that if the customer experienced an actual trouble, it was temporary, such as a brief loss of dial tone.

The use of PIC cable, and burying it without conduit in residential exchange areas on a large scale, has contributed much towards obtaining this degree of dependability of telephone service. The pressurization of exchange cable systems by the use of a dry air compressor has also contributed much toward trouble-free cable distribution systems. It is expected that most cables will be under pressure within the next few years.

Automatic line insulation testing equipment, which can scan as many as 12,000 lines in an hour, is now in use. This equipment turns up trouble before the customer is aware of it.

Even the telephone instrument has been improved. Today, customers report trouble with the telephone on an average of once every 10 years, compared to every seven years in 1940, and every 5 years in 1930.

One big problem in the modern telephone plant is the increase in telephone cord troubles during the past few years. It is reported that since 1955, cord troubles in the Bell System have increased 39 per cent. Over one-third of all station set troubles were due to cords last year. In fact, 15 per cent of all the troubles in the exchange telephone plant, which includes cable, drop wire, and central office equipment, as well as station sets, was attributed to cords last year. Obviously, an all-out effort is being made to improve cords.

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An exhibit center designed to bring the Bell System story to the 5 million Americans who each year visit Disneyland near Los Angeles, Calif., is now under construction. A joint project of the Pacific Telephone & Telegraph Co., AT&T, and of Western Electric, this exhibit will be ready for operation in the near future.

The outstanding feature of this exhibit is a circular movie theatre. It has a screen that extends around the wall to form a complete circle, and uses a process called "Circarama," which gives audiences the feeling of being surrounded by the scenes they are viewing.

The theatre will present a colorful cross-country travelogue called "America the Beautiful" in which occasional stops are made at points of interest, including Long Lines Headquarters of the AT&T Co. Moreover, in the exhibit building will be displays on direct distance dialing, color telephones and other examples of the system's efforts to give the nation the best possible service.

•

We visited the United States Senate chamber recently and were surprised to note the extensive use made of telephones by clerks and pages while the Senate was in session.

We also had a ride on the monorail train through the tunnel between the new Senate office building and the Capitol.

•

While traveling around the country, we observe that many metal guy guards have obviously been hit by motor vehicles and are bent and twisted in grotesque shapes. This causes us to wonder if the present types of guy guards really provide a suitable target. In all probability, they do, and without the use of these guards, many more guys would be hit and damaged.

It would appear, however, that a plastic guy guard of some type could be used to advantage. This guard, if hit, would in all probability resume its original shape. Plastic, however, in order to withstand the light, must be black, which does not provide a good target. Perhaps, the black plastic could be striped with red Scotchlite, or other reflecting material, to provide a suitable target, day or night.

•

The question has been raised as to whether it is possible to dial a number by tapping the switchhook when the dial is locked.

We know positively that this can be done by some people, for we have witnessed this operation on numerous occasions. All that is required is a good sense of rhythm and a steady hand. We have also observed troublemen call numbers by tapping the punching in a cable terminal with one clip of a test set.

A telegraph operator should experience no difficulty in dialing numbers by switchhook tapping.

•

The writer recently flew to Albuquerque, N. M., and San Antonio, Tex., for conferences with military and Signal Corps engineers on in-dialing to large PBX systems. The conferences were a success and we can report that the sun really shines in that section of the country. Moreover, that their hospitality and air-conditioning are both of the very best type.

•

Crosstalk: It is reported that the word "virus" was originated by someone who couldn't spell "pneumonia."

•

Egotism is the ability to recognize qualities in yourself which others can't see.

•

People are lonely because they build walls instead of bridges.

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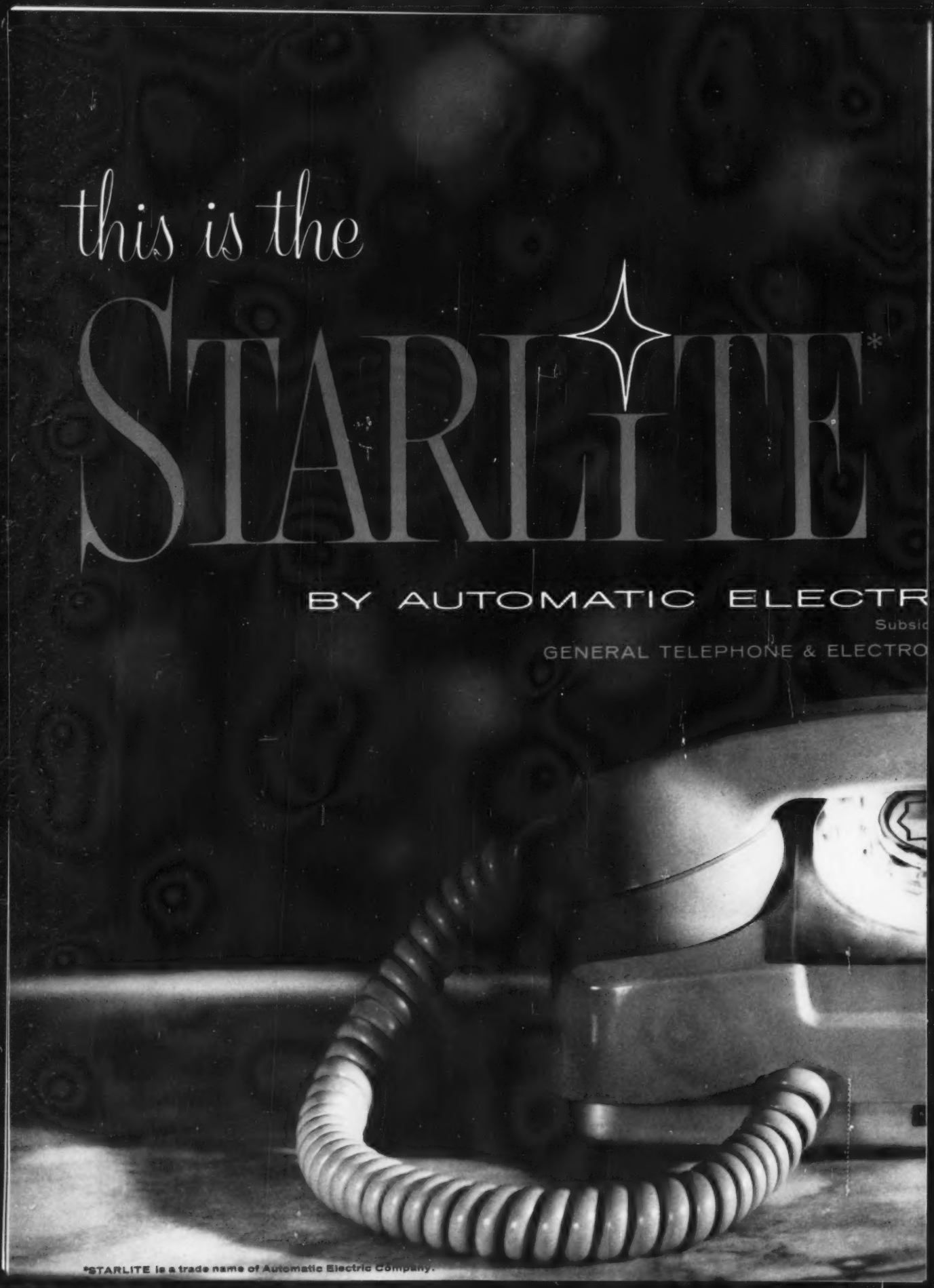
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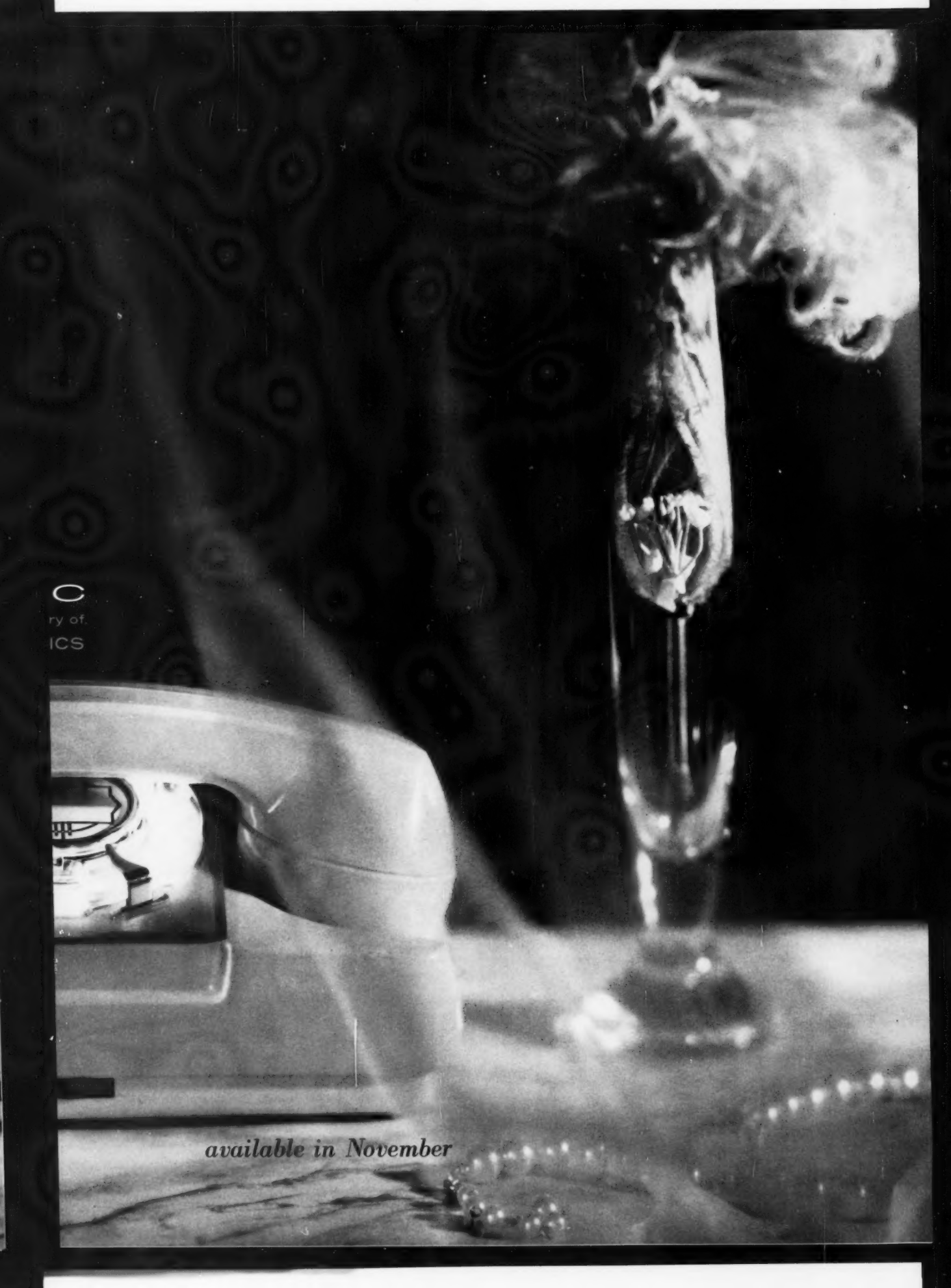
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USITA Management Course Awards Certificates to 46

FORTY-ONE Independent telephone men, representing 30 companies, went back to school for four weeks to attend the United States Independent Telephone Association's 1960 Management Development Program held at the University of Kansas School of Business, Lawrence. Also participating in the course, which was held from July 10 to August 5, were a representative from each of two Bell companies, one from International Telephone & Telegraph Co., one enrollee from Chile, and one from Puerto Rico.

The program is under the direction of Dr. James R. Surface, dean of the University's School of Business.

The case method of instruction is used extensively during the course. This requires the individual first to analyze an actual business problem, and then to test his ideas about the case against those of his colleagues and the instructor. Out of this continual case problem analysis and discussion, the individual is helped to improve his ability to analyze business problems, make better decisions and to communicate more effectively with business associates.

Delivering the commencement address at the graduation ceremony on Aug. 5 was Col. William C. Henry, president and general manager of the Northern Ohio Telephone Co., Bellevue, O.

He discussed the responsibilities of management in the light of tomorrow's opportunities and challenges.

"Good management," Mr. Henry emphasized, "is the process of making decisions that keep the best interests of customers, employes, the community, and the owners in their proper balance."

COL. W. C. HENRY

Speaking specifically of the telephone

Taking time off from their studies to have their pictures taken are participants in the United States Independent Telephone Association's Management Development Program at the University of Kansas. First row (bottom), left to right: R. L. Singleton, University of Kansas; P. E. Nelson of Bloomington, Ill.; Alberto Leiva of Santiago, Chile; L. R. Bottomley of Bloomington, Ill.; R. W. Adams of Black River Falls, Wis.; Carl Prellwitz of Fairmont, Minn.; J. G. Gann Jr. of Birmingham, Ala.; William Manion of San Francisco, Cal.; John Connor of Winthrop Me.; J. R. Surface, Dean of the School of Business, University of Kansas.

Second row, left to right: R. R. Olsen, University of Kansas; W. F. Fowler of Erie, Pa.; J. L. Hinrichsen of Waconia, Minn.; Preston Platt of Valparaiso, Ind.; DuWayne Baird of Butler, Pa.; C. W. Statt of Rochester, N. Y.; D. B. Eckrote of Monrovia, Cal.; Richard Kelly of Monrovia, Cal.; R. W. Glerum of Rochester, N. Y.; Kevin Griffin of Grinnell, Ia.; J. D. Brewer of Crossett, Ark.; J. R. Yeager of the Harvard Business School.

Third row, left to right: Allen Goodspeed of Beaverton, Ore.; C. B. Saunders Jr., University of Kansas; W. R. McGrew of Hickory, N. C.; W. W. Thomason of London, Ky.; H. M. Waller of Freeport, Ill.; W. A. Leigon Jr. of San Angelo, Tex.; J. R. Castanera of San Juan, Puerto Rico; James Ornellas of Honolulu, Hawaii; Richard Dircks of New London, Ia.; A. F. Bradner of Middletown, N. Y.; J. P. Trotter of Kansas City, Mo.; I. W. Gleason of New York, N. Y.; R. B. Hobson of Lincoln, Neb.; F. R. Westlake of Honolulu, Hawaii; Wilson Garnett of Charlottesville, Va.; John Whittaker of Everett, Wash.; Frank Pinet, University of Kansas.

Fourth row, left to right: B. M. Witner of Harrisburg, Pa.; Cecil Stokes of Newton, Ia.; Leonard Harris of Brownwood, Tex.; William Schilling of Somerset, Pa.; R. D. Bonnar of Ashtabula, O.; Brice Stark of Brownwood, Tex.; C. B. Barksdale of Greenwood, S. C.; M. N. Drew of Quincy, Fla.; Ernest Menendez of Tallahassee, Fla.; Richard Lashley, University of Kansas, and Dallas Reid of Charlottesville, Va. Not present for this picture were Beverly Pryor and Herbert W. Frahm, both of Santa Monica, Cal. and L. A. Burrows of Henrietta, N. Y.

industry, Mr. Henry commented: "Our communications system is regarded as an outstanding business achievement, representing the best of free enterprise in America. It represents the work of many telephone people during nearly a century of industrial growth in this country. Today we find ourselves operating in a new kind of business climate."

As to future challenges within the industry, he said: "The number one endeavor of the industry is providing our customers with a high quality of communications service."

In congratulating the participants for their achievement in completing the Program, Mr. Henry stated: "The thirst for more knowledge is one of the motivating reasons for your presence here and why you have applied yourself so industriously during these past four weeks. Self-improvement is a never-ending necessity if we are to acquire incentive and inspiration to do a better job."

Other graduation speakers were Richard Lashley, assistant director of the USITA Management Program, and assistant professor of business administration at the University of Kansas, who delivered both the "Greetings and Farewell," and Robert J. Fegan of Junction City, Kan., chairman of the USITA Personnel Committee, who introduced Mr. Henry.

Attending the graduation ceremony for the USITA's Management Course at the University of Kansas were, left to right, Richard Lashley of the University of Kansas; W. Clark Wescoe, University chancellor; Robert J. Fegan of Junction City, Kan., chairman of the USITA Personnel Committee; and Col. W. C. Henry of Bellevue, O., who delivered the commencement address.

Certificates were presented by Dr. W. Clarke Wescoe, chancellor of the University.

A reception was held following the commencement for the graduates and their guests, among whom were members of participants' families, members and directors of USITA and representatives of several state telephone associations.

Also present were various members of the USITA Personnel Committee, which helped to develop the program in conjunction with the University of Kansas. In attendance were Kenneth L. Dally of Lincoln, Neb., sub-chairman; J. K. Galloway of Winter Park, Fla.; Adam J. Schwartz of Rochester, N. Y. and Chairman Fegan. Unable to be present were Ralph Beck Jr. of Honolulu, Hawaii and Bert L. Steele of New York City.

School Bus Mobile Telephone In N. D. Adds to Pupil Safety

A TELEPHONE on the school bus that collects children in the rural area around Parshall, N. D. (headquarters exchange of the Reservation Mutual Aid Telephone Corp.), keeps the driver in touch with parents and the school.

E. R. Hilde, Parshall superintendent of schools, points out that this appears to be one of the first installations anywhere of mobile dial telephone equipment on a school bus. It is probably a forerunner of many other such installations, because the idea has obvious merits.

Why hook up a school bus with a telephone system? Superintendent Hilde gives at least two sound reasons: Economy and safety.

The telephone link permits tighter scheduling and can summon service and repair fast in an emergency, so that the school district can operate with one less bus than would normally be needed.

Of more vital concern to parents in the community is the margin of safety which the telephone network assures for children during the bleak winter months when wind and snow whip the North Dakota prairies.

Bus driver Robert E. Nelson, already has had occasion to use the telephone on his bus to locate children who were not waiting at the bus stop when he made his morning pickup.

In severe weather, if a child does not show up at the road, Nelson can call the family and ask whether or not the child has left the house. Should some boy or girl fall, or get lost on the way to the bus stop, the mobile telephone may literally be a lifesaver.

If a child is sick, the parents call the school. Someone there, in turn, telephones the bus and tells Nelson not to worry about picking up that child.

Two-way radios had been considered at first for Parshall's school buses.

When Fred Ahlgren, manager of Reservation Mutual Aid Telephone Corp. heard of this, he proposed the advantages of the cooperative's new mobile telephone service.

He pointed out that:

"The telephone is . . . more versatile because it can be used to call any family direct from the bus, and it does not require a radio operator at the school. Also, it is in operation 24 hours a day."

The mobile unit was placed in operation toward the latter part of the (1959) spring term. This was the first winter for its use.

Driver Nelson finds that the telephone works very much like the one in his own home, except that it has buttons instead of a dial. To place a call, he just presses the buttons, numbered and lettered like the holes in the dial, and the equipment does the rest. The signal is picked up by a radio tower. From there it goes by wire into the regular telephone exchange. . .

Reservation Mutual . . . has 2,300 subscribers and 13 exchanges, plus two transmitters in its mobile telephone facilities. About 60 other subscribers use mobile equipment—Reprinted from January, 1960, *Rural Lines.*

Don Mitchell, GT&E President, To Address USITA Convention

IN KEEPING with the United States Independent Telephone Association's traditional policy to obtain for its annual Fall convention outstanding speakers of national reputation, members of the Washington staff are busily engaged in preparing for the program of the 1960 convention to be held in Chicago on October 9, 10, 11 and 12, at the Conrad Hilton Hotel, according to Leon F. Roberts, USITA director of information.

Among the first to accept an invitation to address one of the convention's general sessions is Don G. Mitchell, president of General Telephone & Electronics Corp., and chairman of its subsidiary, Sylvania Electric Products, Inc.

Mr. Mitchell is recognized as one of the industry's leading authorities on corporate organization and policies, especially in the broad areas of scientific marketing and human relations. A member of the Sylvania organization for 17 years, Mr. Mitchell was elected president and a director of General Telephone & Electronics Corp. when Sylvania merged into General Telephone Corp.

Mr. Mitchell has had a meteoric career in the business world. When he joined Sylvania in 1942, the company's sales that year were 32 million dollars. Sylvania sales now exceed the annual rate of 400 million dollars.

Born on Apr. 26, 1905, he attended the University of Cincinnati and the University of Florida, and subsequently was associated with several large industrial corporations in various executive capacities, including McGraw-Hill Publishing Co., Niagara-Hudson Power Co., American Can Co., Marshall Field & Company, and Pepsi-Cola Co. He left Pepsi-Cola in 1942 to join Sylvania. He is at present a member of the board of directors of a score of the country's larger business organizations.

Frequently sought as an advisor by government bodies, Mr. Mitchell was appointed advisor on electronics to the Under Secretary of Air at the start of the defense program which followed the outbreak of the Korean War. During Paul Hoffman's direction of the Marshall Plan for European Relief, he was chairman of an unofficial advisory group of industrialists. He also served as a member of the Advisory Council to the Senate Committee on Trade Policies. He has been a director of the National Association of Manufacturers and the National Sales Executives.

Mr. Mitchell is a gifted speaker of national stature and reputation, and he will add lustre to the closing general session of the USITA convention on Oct. 12, in the Williford Room at the Conrad Hilton Hotel.

USITA Executive Vice President Clyde S. Bailey reports that other speakers of exceptional ability will address both the general sessions and the usual technical conferences, and that there will be no lack of the customary social and entertainment activities, including the association's annual banquet, always a highlight of this great gathering of the men and women of Independent telephony.

Meanwhile, the various manufacturers of equipment and supplies are preparing their exhibits which will completely occupy the fifth and sixth floors of the world's largest hotel, and which are always the outstanding attraction of the convention.

The names of other speakers and additional program details will be announced shortly.

D. G. MITCHELL

Kappel Discusses Economic Growth and Regulated Industry

FREDERICK R. KAPPEL, president of the American Telephone & Telegraph Co., in an article in the New York *Herald Tribune*, predicted that the subject of the United States' economic growth would come up for much debate during the forthcoming political campaign.

Under the title, "Wall Street, U.S.A.," Mr. Kappel wrote as follows: "As we approach the political campaign, it is interesting to see that much of the preliminary oratory focuses on economic growth." He added that "rising interest in this topic is highly desirable, for real economic growth measured by real dollars—as opposed to the mirage of growth by inflation—is vital to the nation."

He continued: "We must achieve it to meet the needs of our increasing population, and to meet the economic challenge from overseas.

"An awakening to the need for growth is also evident at other than the national level. People in local communities discuss ways to attract more industry, and take aggressive steps to do so.

"I hope that out of this tide of discussion will come sharper public recognition that future economic growth, like former growth, can result only from rising investment, production and employment by private industry. For it is growth in the private sector of the economy that must support growth in the public sector with tax dollars.

"Regulated industry — the transport power, fuel and communications companies—provide services essential to the efficiency and progress of all other business. Our whole economic and social life requires these services. So does our defense. The nation's growth demands their growth.

"Nearly a quarter of all American corporate capital—100 billion dollars—is invested in regulated industry. Four million persons earn their livelihood in regulated companies, and their annual payrolls amount to 21 billion dollars. Another three million persons own shares in these companies. One in nine American families has a direct stake in regulated industry. The role regulated industry plays in economic growth is vividly illustrated by the fact that it did more than a third of all the capital spending by business for plant and equipment in 1958.

"Clearly, regulated companies can and do help economic growth in many ways. If public attention were focused on the goal of making regulated industry an increasingly buoyant force, I am

(Continued on page 51)

REA Approves Ten Telephone Loans

More than 17,178 subscribers in 10 states will benefit from 10 telephone loans approved recently by the Rural Electrification Administration as follows:

Commerce (Ga.) Telephone Co.; $1,114,000; Aug. 1.

Funds will help to provide initial service for 1,927 subscribers. The company plans to construct new dial exchanges at Nicholson and Pendergrass.

REA loans to this borrower will aid in enabling it to bring new and improved service to 5,670 subscribers. Five of seven proposed exchanges now provide dial service to approximately 3,375 subscribers.

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Western Illinois Telephone Co., mailing address: New London, Ia.; $4,045,000; Aug. 3.

This loan will assist in improving service for 5,327 subscribers and in furnishing initial service to 1,401 subscribers.

As a nucleus for the new service, the company proposes to acquire three telephone companies and four small subscriber-owned lines now furnishing dial, common battery and magneto service to the existing subscribers. The companies, all located in Illinois, are: Mississippi Valley Telephone Co., Carthage; Augusta Mutual Telephone Co. and the Denver Telephone Co. The acquired facilities consist of 14 exchanges.

The borrower plans to build 11 new dial central offices and an addition to the Carthage building to house new and larger dial facilities. Both the toll center and commercial office equipment will remain in the Carthage building.

On completion of the system provided with the aid of this and prior REA loans, the borrower will be serving 12,478 subscribers. The system will consist of 26 exchanges, 12 of which now furnish dial service to approximately 4,580 subscribers.

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Tri-County Telephone Co., Inc., Ashland, Ala.; $1,720,000; Aug. 5.

This loan will help to furnish initial service to 2,076 subscribers and to improve service for 3,141 subscribers. This new borrower of REA funds now serves the existing subscribers through dial exchanges at Ashland, Heflin, Lineville, Wadley and Wedowee.

The Tri-County company proposes to replace the Wadley exchange facilities with a new dial office building, and to expand the dial facilities of the four remaining exchanges. In addition, new exchanges have been established at Lecta and Woodland, and new dial offices will be constructed there. A portion of these funds will be used to refinance the borrower's existing indebtedness incurred by improving the existing system.

Wilbur B. Nolen is president and DeForest M. Nolen is manager of the Tri-County company.

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St. Helena Telephone & Telegraph, Inc., 6026 Memphis Street, New Orleans 19, La.; $261,000; Aug. 5.

This loan will assist the company in furnishing initial service to 582 subscribers. On completion of the system provided for with the aid of this and prior REA loans, the borrower will be furnishing new and improved service to 1,216 subscribers. The system will consist of exchanges at Greensburg and Montpelier.

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The Old Town Telephone System, Winston-Salem, N. C.; $979,000; Aug. 5.

Proceeds will help to finance initial service for 1,777 subscribers in the borrower's present service area. In order to provide this additional service, the borrower proposes to divide the area served by its Rural Hall exchange, and establish a new exchange at Stanleyville. A new dial central office will be constructed at Stanleyville.

Facilities provided for with the aid of this and prior REA loans will enable the borrower to furnish new and improved service to 5,600 subscribers. Four of the proposed exchanges now provide dial service to approximately 3,900 subscribers.

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Camden (Ind.) Telephone Co.; $107,000; Aug. 9.

Funds will help to improve service for 201 subscribers and to furnish initial service to 35 subscribers. As a nucleus for the additional service, the borrower plans to acquire the Rockfield Telephone Co. now furnishing magneto service to the existing subscribers.

The borrower proposes to serve the Rockfield community from its Camden exchange. Plans for the completed dial office at Camden include space for 80 additional lines of central office equipment to handle the Rockfield area. REA loans to this borrower will assist in providing new and improved service for 667 subscribers. The system will be served through the Camden exchange.

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Consolidated Telephone Co., Brainerd, Minn.; $50,000; Aug. 9.

This loan will be used to aid in improving service for 46 subscribers and in furnishing initial service to 39 subscribers. As a nucleus for the new service, the borrower plans to acquire the properties of five small subscriber-owned lines. These lines, located in and around Cushing, now furnish magneto service to the existing subscribers. Dial service for the area will be provided by the borrower's Randall exchange.

This and prior REA loans will help the borrower to furnish new and improved service to 1,874 subscribers. The completed system will consist of eight exchanges which now furnish dial service to approximately 1,650 of the subscribers.

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Clifton (Tex.) Telephone Co.; $124,000; Aug. 11.

These funds will assist in improving service for 108 subscribers and in furnishing initial service to 28 subscribers. The existing subscribers now receive magneto service from the Norse Telephone Co. which the borrower has recently acquired. Provision is made in the loan to reimburse the borrower for this acquisition.

Dial service for the Norse community will be furnished from the borrower's adjacent Clifton exchange. Funds also are included in the loan for an addition to the headquarters facilities at Clifton.

(Continued on page 50)

KNOW OF A BUSINESS THAT LONG DISTANCE CAN'T HELP?

We don't. That's why a continuing Bell System advertising effort urges businessmen of all kinds to use Long Distance to get things done.

It suggests Long Distance as the fast, efficient way to make sales, set up appointments, check on shipments—whatever may be the task at hand.

Much of the advertising runs in general magazines read by men in many different lines of work. And much appears in trade journals addressed to particular kinds of businessmen such as motel owners, florists and purchasing agents.

The result is a steady, nation-wide gain in Long Distance business usage, year after year. And the benefits of this gain are shared by telephone companies everywhere. Selling businessmen on Long Distance is good business for our industry!

BELL TELEPHONE SYSTEM

Courts and Commissions

Illinois Company Protests Injunction Halting Expansion

The Inland Telephone Co., Champaign, on Aug. 8 filed a brief protesting the action of the Bloomington, Ill. Circuit Court in issuing a temporary injunction ordering it to stop constructing facilities and to stop serving customers who are alleged to be subscribers of the Cooksville Telephone Co. (TELEPHONY, July 30).

The Cooksville company claims that six subscribers on the west edge of its territory are now being served by Inland's Towanda exchange and that Inland is attempting to connect three more Cooksville subscribers to Towanda.

In its motion, the Inland company said the injunction, issued by Judge William C. Radliff on July 12, is illegal: (1) because the court at Bloomington is without jurisdiction to issue an injunction; (2) the order was issued without notice being given the defendant; and (3) no bond was furnished by the plaintiff.

Drop Jurisdiction Plea in Neb.; OK Raise; Ask Note Approval

At the applicant's request, the Nebraska Railway Commission on Aug. 11 dismissed the application of the S & S Construction Co., Olathe, Kan. for a ruling as to whether the commission had jurisdiction over "the construction, maintenance and leasing" by the company of a proposed underground intersite communication system to serve the Lincoln (Neb.) Atlas Missile Squadron (TELEPHONY, Aug. 13).

The S & S company also had asked for a ruling as to whether the commission had authority to order the three common carriers now serving the area to integrate their facilities with that of the proposed installation of the S & S company.

The missile complex area is now served by the Lincoln Telephone & Telegraph Co., the Capital Telephone Co., Hickman, and Palmyra Telephone Co.

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In other actions, the commission granted in part an application of the Cuming County Independent Telephone Co., Wisner, for authority to adjust its rates and charges.

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Also in Nebraska, the commission on Aug. 16 was to have heard an application by the Stanton Independent Telephone Co. for authority to issue notes and to obtain a mortgage.

Approve Rate Increase For Minnesota Company

The Minnesota Railroad & Warehouse Commission on Aug. 9 approved the application of the Citizens Telephone Co., Maynard, for a rate increase, effective after Aug. 31.

The Citizens company, which serves 180 company-owned stations and 234 switch-line stations, through its exchange at Maynard, plans on converting its switchboard to dial in 1961. The company presently is engaged in reducing the number of stations per line on its distribution system. It expects the increased rates to enable it to make the investment in the new dial switchboard.

Under the new rates, the Citizens company will have a net income of $1,632, giving it a 5.63 per cent return on its current value rate base of $28,942. Under its old rates, it had a yearly deficit of $287.

Old and new rates are as follows:

	Old	*New*
One-party business	$4.25*	$6.00
Two-party business	3.75	5.25
Multi-party rural business.	3.75	5.25
One-party residence	2.50*	3.75
Two-party residence	2.00	3.25
Four-party residence	1.50	2.75
Multi-party rural residence	3.00	—
Multi-party rural residence, 10 or less	—	4.25
Multi-party rural residence, 11 or more	—	3.00

*Optional—Common Battery —$.50 additional

Grant New York Bond Issue

Rochester Telephone Corp. has received approval from the New York Public Service Commission for sale of 12 million dollars of first mortgage bonds (TELEPHONY, July 9). Proceeds from the bonds, which will mature in 1993, will be used to pay off bank loans and to meet construction costs. The company has spent more than 100 million dollars on plant improvements since the end of World War II.

Schedule Hearings on 3 Rate Applications in Wis.

The Wisconsin Public Service Commission on Aug. 23 was to have heard the application of the Midway Telephone Co., Medford, for authority to increase its rates at Medford, Stetsonville, and Dorchester.

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Hearings before the commission were also scheduled on Aug. 24 and 25 respectively on the applications of the Solon Springs Telephone Co., Inc., for authority to increase its rates to offset an operator wage increase; and of the Farmers & Merchants Telephone Co., Coleman, for a rate increase.

Alabama Independent Gets One-Third of Amount Asked

The Alabama Public Service Commission on Aug. 12 announced approval of a $30,429 rate increase for the Gulf Telephone Co., Foley, a little more than one-third the $87,300 requested.

The commission authorized the raise to enable the company to make up for increased operation costs and to borrow money for expanded and improved service.

The Gulf company last had a general rate increase in 1955.

SW Bell Asks Kan. Court to Suspend KCC Rate Order

The Shawnee District Court has set a Sept. 6 hearing date on Southwestern Bell Telephone Co.'s petition to suspend a Kansas Corporation Commission order granting it only part of a requested raise, and to charge higher rates pending the determination of the company's appeal of the order to the district court (TELEPHONY, July 16).

On May 27, the commission granted the company 1.3 million dollars of a 5.8 million dollar raise which had been

requested. Southwestern Bell then appealed the KCC order to the district court. No hearing date reportedly has been set on this appeal.

The company said that a recent wage increase, adding $880,000 to its costs, would virtually offset the increase allowed by the commission.

OK Sale; Acquisition of Majority Control in Minn.

The Minnesota Railroad & Warehouse Commission on Aug. 15 approved the sale of the Two Rivers Telephone Co., Lancaster, to the Wikstrom Telephone Co., Inc., Karlstad. The Two Rivers company serves approximately 360 stations and operates in Lancaster and Lake Bronson.

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Also on Aug. 15, the commission authorized the Ericson Telephone Co., Hector, to acquire the majority controlling stock and managerial authority to operate the Watertown Telephone Co.

The Watertown company, which will continue under its present name, serves approximately 5,516 stations in and around Maple Plain, St. Bonifacius, Mound, Mayer, New Germany, Watertown and Delano.

Southwestern Bell Wins Texas Raise

The Bastrop (Tex.) City Council has authorized increased rates for Southwestern Bell Telephone Co., it was reported on Aug. 11. Old and new rates are:

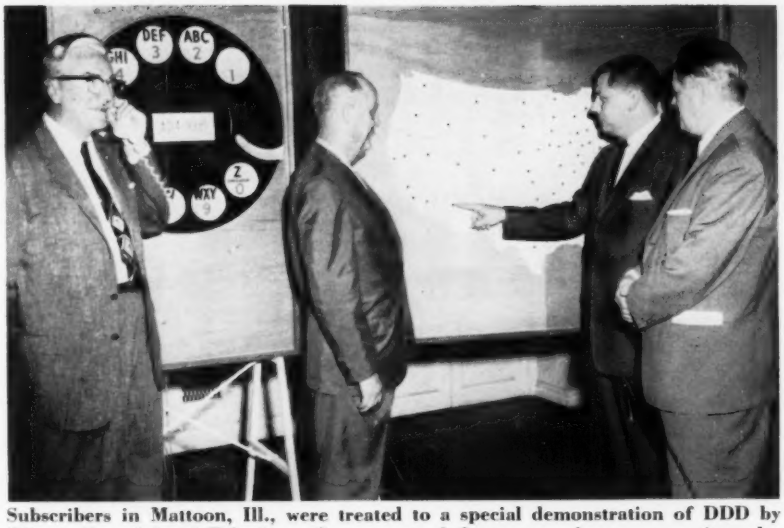
	Old	*New*
One-party business	$9.00	$9.75
One-party residence	5.00	5.25
Multi-party residence	4.00	4.25

Ill. Consolidated Conducts Vigorous DDD Education

An intense marketing and customer education program paved the way for Illinois Consolidated Telephone Co.'s introduction to Direct Distance Dialing (DDD) in the Mattoon-Charleston (Ill.) area.

Prior to their recent cut-over, the company conducted a large scale campaign to introduce the new service and show subscribers how they may save on telephone bills by dialing station-to-station DDD calls.

Over 500 PBX customers and large toll users were personally contacted during the pre-DDD campaign. The company also telephoned an additional 2,500 customers, with service representatives reading a prepared script which highlighted the new service. Along with these activities, large



Subscribers in Mattoon, Ill., were treated to a special demonstration of DDD by Illinois Consolidated Telephone Co. as part of the company's pre-conversion education program. Here R. S. Owen, district commercial manager of the company points out an area code number listing on a blow-up map of the U. S. From left are Ed Udell of Illinois Bell Telephone Co., Harry Edwards of Mattoon, Mr. Owen, and Roy Thompson of Mattoon.

demonstration units were prepared to show customers how DDD operates. Some 1,100 persons viewed the demonstration.

Booklets, outlining procedures and area code number listings, were distributed to all subscribers to further illustrate DDD's advantages. An extensive newspaper advertising program was also used to tell the story.

Employes and families of Illinois Consolidated Telephone's Mattoon and Charleston exchanges were invited to attend a demonstration in Mattoon and a tour of the exchange facilities.

Final check of automatic toll ticketing equipment is made by George Good, central office maintenance supervisor, and Robert Stevenson, central office maintenance man of Illinois Consolidated Telephone Co., which joined the nationwide Direct Distance Dialing network recently.

The new DDD equipment—Strowger Automatic Toll Ticketing (SATT)—is the first Type 59 system to be installed in Illinois by Automatic Electric Co. The checking operator system contains 37 ticketers, four tabulators and 11 transenders. Automatic billing is prepared from IBM punched cards.

The SATT apparatus serves the two main exchanges in Mattoon and Charleston, as well as neighboring Ashmore, Oakland, Humboldt, Gays, Windsor, Neoga, and Toledo. Along with the cut-over, the Oakland exchange was converted to seven-digit All-Number-Calling (ANC).

Illinois Consolidated Telephone Co. serves 55,000 subscribers in 35 communities of central Illinois.

Pa. Corp. Names Comptroller

The appointment of John A. Martin as comptroller and general office manager of The Lycoming Telephone Co., Pine Grove, Pa., effective Aug. 1, has been announced by Ralph M. Hyle, president of the board. Mr. Martin will act for the corporation as assistant treasurer, handling finances as well as stock and security transactions.

Unchristened by Experience

"The fortitude which has encountered no dangers, that prudence which has surmounted no difficulties, that integrity which has been attacked by no temptation, can at best be considered but as gold not yet brought to the test, of which therefore the true value cannot be assigned."—DR. JOHNSON.

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Low maintenance. The simplified operation of this unit insures dependable, trouble-free service.

For complete information about this new, compact answering unit—or any other Electronic Secretary Industries product—contact your distributor (listed below).

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NEW MODEL BPR-1—Size: 11" wide by 14" long by 6" high

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PT&T Employe Wins Vail Medal for Saving 2 Lives

An Alhambra, Cal. employe of the Pacific Telephone & Telegraph Co., Jack S. Ewing, on Aug. 8, received the silver Vail medal and a cash award for his heroic rescue of two men from a sinking boat in rough seas.

Mr. Ewing is Pacific Telephone's Foothill Division superintendent of buildings, supplies and motor vehicles. While on a weekend cruise to Catalina Island, in his 37-foot boat, the "Trujack," Mr. Ewing heard a distress call from another cruiser. He radioed for the Coast Guard, and altered his own course to reach the nearly submerged boat.

He made several attempts to attach a tow line, which broke in the heavy seas. While in danger of crashing his own boat into the crippled craft, he maneuvered into position so that he could take aboard two men. Shortly after he hauled them aboard, their own boat sank.

In citing Mr. Ewing for his heroism, Southern California area vice president and general manager, William E. Quirk said his action "exemplifies the finest traditions of service to the public."

Mr. Ewing received the Vail medal and a check for $1,000 from General Plant Manager Robert B. Dugger.

Lt. Commander Ruben Young of the Coast Guard auxiliary for the district also praised Ewing's seamanship and bravery in saving two lives, at great personal risk.

The Vail medal, given in memory of AT&T president Theodore N. Vail, has, since 1920, given recognition to outstanding service performed by telephone employes.

Announce Three Promotions At General of Southeast

Joe G. Winn of Sumter, S.C., division plant superintendent for General Telephone Co. of the Southeast, has been named vice president and division manager of the company's South Carolina division.

Mr. Winn will succeed Raymond Sheehan, who is being promoted and transferred to the General Telephone Co. of California.

John F. Sears of Sumter, formerly division plant engineer, will assume the duties of division plant superintendent.

Announcement of the three promotions, all effective Aug. 1, was made by the General company's operating vice president, G. A. Klein.

Mr. Winn will now direct the company's over-all operations in its 26

South Carolina exchanges from the division offices in Sumter.

A native of Missouri, he began his telephone career 20 years ago in that state with the Missouri Telephone Co., which later became a part of the General Telephone System.

Since his first job as a lineman in Centralia, Mo., he has held assignments of increasing responsibility in various departments of the company.

He transferred to the former Southern Continental Telephone Co. as district manager in Laurens, S.C., in 1951 and was promoted to division plant superintendent of General of the Southeast in 1958.

J. G. WINN

A veteran of World War II, Mr. Winn served in the U.S. Coast Guard from 1942-1945.

John Sears began his telephone career 23 years ago in South Carolina as a lineman for the former South Carolina and Georgia Continental Telephone companies.

He transferred to Sumter in 1939 as a clerk in the plant department. In 1946, he was promoted to assistant to the plant superintendent, and became division plant engineer for General of the Southeast in 1957.

A native of Richlands, Ga., he grew up and attended school in Edison, Ga.

During World War II, he served in the U.S. Navy.

Justice Demands Fair Trade

"If you attempt to beat a man down and to get his goods for less than a fair price, you are attempting to commit burglary, as much as though you broke into his shop to take the things without paying for them. There is cheating on both sides of the counter, and generally less behind it, than before it."—BEECHER.

NUMBER TS-23 - *Designed for carrier circuit use on all "point" type transposition hardware and at intervening non-transposition poles.*

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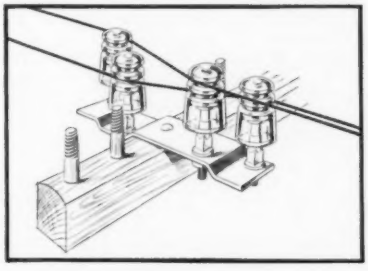
Hemingray Glass Insulators stand up under severe conditions, do not deteriorate, provide the service you need to assure continuous operation of communication lines. The dependability of Hemingray Insulators as proved by years of fine performance is one of the reasons behind their world-wide acceptance.

Hemingray has pioneered many insulator developments to keep pace with requirements, improve communication systems, assure you a dependable source of supply.

An up to date distribution system makes Hemingray Insulators available when you want them and where you need them.

Hemingray Glass Insulators are a product of Kimble Glass Company, subsidiary of Owens-Illinois, Toledo 1, Ohio.



This carrier circuit transposition developed by the Bell System takes only the crossarm width of one conventional pin.

World standard for quality Since 1870

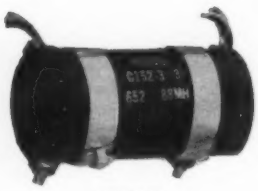
HEMINGRAY INSULATORS
AN (I) PRODUCT

OWENS-ILLINOIS
GENERAL OFFICES • TOLEDO 1, OHIO

IT'S NEW!

CEECO TYPE C 152 LOADING COIL CASES WITH TYPE C 651 (44MH) OR TYPE C 652 (88MH) COILS

C152-1



C152-3

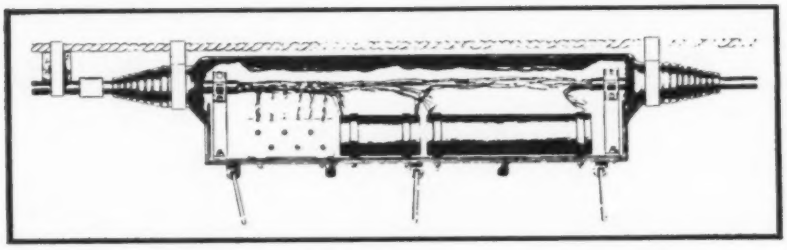
C152-6

★ MOUNT DIRECT IN BURIED WIRE-CABLE TERMINALS AND PLASTIC CABLE SPLICE TERMINAL CASES

★ MOUNT DIRECT IN PLASTIC CABLE SPLICE

★ COILS ENCAPSULATED IN PLASTIC . . . MOISTURE FREE

★ SIZE AND WEIGHTS REDUCED YET MAINTAIN SAME OR BETTER ELECTRICAL CHARACTERISTICS



TYPE C152 CASES MOUNTED IN PLASTIC CABLE SPLICE-TERMINAL CASES

LOADING COIL CASE TYPE	CONTAINS COILS TYPE C651 OR C652	APPROXIMATE CASE SIZES DIAMETER	LENGTH	MAXIMUM WEIGHT
C152A	1 to 3 Coils	1½"	Up to 3"	½ Lb.
C152B	4 to 9 Coils	1½"	Up to 6¼"	1½ Lbs.
C152C	10 to 18 Coils	1½"	Up to 13"	3 Lbs.
C152D	19 to 28 Coils	2"	Up to 18"	6 Lbs.

Write us for assistance on your loading problems
CEECO loading coils are sold by your telephone equipment supplier

COMMUNICATION EQUIPMENT & ENGINEERING COMPANY
5646 West Race Avenue • Chicago 44, Illinois
Phone EStebrook 8-3109

LINE CONCENTRATORS

Continued from page 26

power failure just described, the previously extended line may still receive and make calls.

A number of concentrators can be used in a central office area. However, a concentrator unit must be provided in the central office for each subscriber concentrator unit. Other than this, there are no limitations on the number of units that may be used in an area.

A telephone engineer or manager must always give consideration to the future when considering the purchase of any piece of equipment. In this respect, line concentrators are a good long-term investment.

Basically, the telephone industry is no different today from 50 years ago. Although many new methods of communication have been added in the industry—people are still talking to people. The only differences are in the way the calls are completed and in the number of calls that must be handled.

Yes, things are booming all over the country. People, commerce, and industry are moving into the country. Economic growth has only scratched the surface of the ultimate potential. Contrary to some expectations, there are no indications that the country is going to burst at the seams next year or in the next hundred years. However, there are positive indications that telephone companies will be faced with complex expansion and growth problems this year and during the years that lie ahead. Many of the expansion and modernization problems facing telephone companies today and in the future can be solved economically and efficiently with line concentrators.

REA LOAN APPROVALS

Continued from page 41

On completion of the facilities provided with the aid of this and prior REA loans, the borrower will be furnishing new and improved service to 1,418 subscribers. The system will consist of three exchanges which now furnish dial service to approximately 1,185 of the subscribers.

•

Chibardun Telephone Cooperative, Dallas, Wis.; $352,000; Aug. 11.

Proceeds will help to improve service for 501 subscribers and to furnish initial service to 183 subscribers. As a nucleus for the new service, the Chibardun Cooperative has recently acquired the Cameron Telephone Co. which furnishes magneto service to the existing subscribers. Funds are included in this

loan to reimburse the borrower for the acquisition. A new dial office building will replace the Cameron exchange facilities.

On completion of the system provided for with the assistance of this and prior REA loans, the borrower will be furnishing new and improved service to 2,924 subscribers. The system, when complete, will consist of seven exchanges.

•

Northwest Mutual Aid Telephone Corp., Columbus, N. D.; (Mailing address: Ray, N. D.); $73,000; Aug. 12.

With the aid of this and prior loans the borrower will finance the installation of mobile dial radio-telephone facilities to serve 37 subscribers in its service area. The mobile dial equipment also will be used for system maintenance.

On completion of all facilities provided for with the help of REA loans, the borrower will be able to furnish new and improved telephone service to 3,313 subscribers. The system will consist of 13 dial exchanges, all of which are in operation and serving approximately 2,600 of the subscribers.

KAPPEL DISCUSSES GROWTH

Continued from page 40

confident the result would greatly benefit the general welfare.

"Services vital to the defense, the efficiency and the growth of the entire economy are involved. All public budgets also are affected, because regulated industry now pays 7 billion dollars of taxes annually, not to mention the taxes paid by its employes and shareowners.

"In considering how to encourage the greatest progress of regulated industry, it seems to me the key question is that of incentive. Our entire private economy is based on the energizing quality of the profit motive, which stimulates endless effort to increase efficiency, develop and market new and better products, extend employment opportunities and respond to community and national needs.

"The American people will get the greatest value from regulated industry, I am confident, only when the same energizing incentive is present there as it is elsewhere. This will spur us to make our greatest possible contribution to the country's total progress."

Honorable Promises

"Promises — the ready money that was first coined and made current by the law of nature, to support that society and commerce that was necessary for the comfort and security of mankind."—CLARENDON.

Crapo HTL-135

EVERYTHING YOU NEED IN A GOOD RURAL TELEPHONE WIRE

Ample Conductivity
Superior Strength
Dependable Life
Low Cost

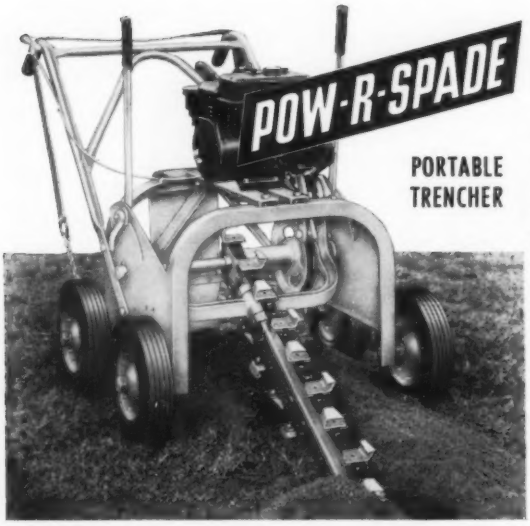
When you or your engineers specify a telephone wire for rural lines you want to be sure that it will fulfill every practical requirement yet be economical to install and maintain. Crapo HTL-135 High-Tensile Line Wire was conceived and developed with that purpose in mind. Its voice transmission and ringing qualities are excellent for subscriber loops in typical rural systems. Its superior physical strength and its fatigue endurance make posible long-span, low-cost construction with an adequote margin of safety and a minimum of maintenance.

Comparative cost studies show that substantial savings can be realized by building rural lines with Crapo HTL-135. For dependable and economical performance, insist upon this reliable, time-proven conductor!

WRITE for Engineering Manual TM-59 containing Sag and Tension Data, Staking Tables and Guying Tables.

Crapo HTL-135
INDIANA STEEL & WIRE CO., INC. MUNCIE, INDIANA U.S.A.

INDIANA STEEL & WIRE CO., INC.
Muncie, Indiana



- Low cost
- Light weight
- Portable
- More in use than any other in its class
- Completely assembled, ready to go to work
- Digs straight, curves, angles — no special setup
- Minimum of working parts — little maintenance
- Digs trenches 3" wide to 24" deep — or 4" wide to 18" deep
- Dealers in principal cities

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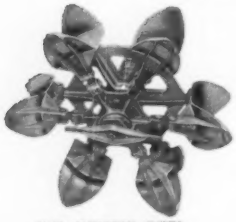
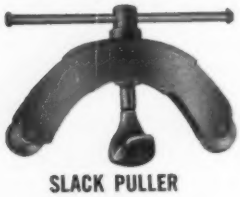
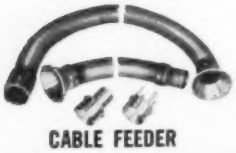
Old Lincoln Highway at Pa. Turnpike, Trevose, Pa.



C-R POWER REEL



SLACK PULLER



CABLE FEEDER

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AERIAL TENTS
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CABLE BLOCKS
CABLE LASHERS
COAXIAL CABLE TOOLS
LASHING WIRE
CLAMPS AND GRIPS
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Over 600 various items of Line Construction Tools, Maintenance & Pressure-Testing Equipment in stock for immediate shipment

IN THE NATION'S CAPITAL

Continued from page 18

Even though some of the inflating gases within may have leaked out, there had been no distortion of shape, as of Aug. 20. Thousands in the United States and elsewhere have watched the satellite—visible like a brilliant star—move briskly across the star fields at night.

A Montevideo, Minn., observer said on Aug. 17, that it appeared to wobble occasionally, and wondered if shifting instruments might cause this. Not so, said the Smithsonian Astrophysical Observatory, Cambridge, Mass. There is no variation in its shape or orbit.

A Cleveland researcher, A. L. Jones, noted through a telescope that ECHO's light was alternately dim and bright and deduced that the balloon was not a perfect sphere and might be leaking. Not so, said the MIT Lincoln laboratories at Round Hill, Mass. Both visual tracking and radio propagation indicate the sphere is literally in good shape. Like other heavenly objects, it appears to scintillate because of the effect of the atmosphere.

On its very first orbit, on Aug. 12, the sphere acted as a passive reflector for a recorded message by President Eisenhower, sent from the Jet Propulsion Laboratories at Goldstone, Cal., to the Bell Telephone Laboratories at Holmdel, N. J. Since then, it has been used for progressively more complicated experiments in two-way signal and voice communications. Some radio technicians say the next step for experimentation with ECHO I may be in data transmission, which means packing a tremendous amount of information into a small package and observing how it is received back from the satellite.

NASA has refined its measurements of ECHO's orbit and now sets its apogee, or peak, altitude at 1,050.9 miles and its perigee, or low point, at 943 miles. On the initial orbit they had been calculated at 1,160 and 1,018 miles, respectively. At apogee, the sphere is moving at 15,636 miles an hour, and at perigee only about 340 miles an hour faster, or 15,980 miles an hour.

Series of Relay Satellites?

It will be recalled that in recent testimony before the Federal Communications Commission, spokesmen for the Bell System indicated that there were plans afloat for eventually launching a series of about 50 satellites to establish a world-wide communications relay system. These would not be like ECHO I, which is just a hollow, "passive"

sphere, against which radio signals merely bounce back to earth terminals. The proposed Bell satellites would include equipment for selecting and boosting signals beamed to them. They could be used not only to handle peak "loads" on telephone calls, but also TV transmission, computer data, and other broad-band radio signals. According to the earlier testimony before the FCC, the proposed orbits would be about 3,000 miles above the earth (ECHO I is a little over 1,000) combined with 23 transmitter-receivers, working in pairs (13 in the United States). The orbits would be so spread out as to make some satellites always "in sight" and, therefore, available for signal relay duty.

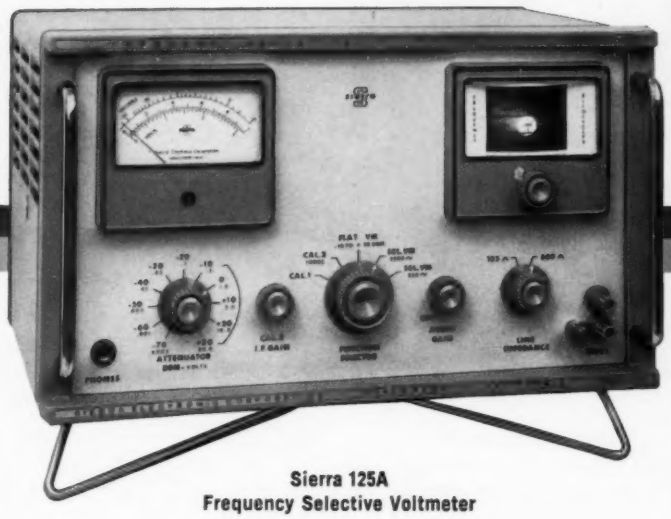
As further indication of progress already made by the industry was the announcement last week that Bell laboratories had initiated the first successful two-way telephone conversation via the ECHO I satellite. Bell scientists at Holmdel, N. J., spoke to the Jet Propulsion Laboratories in Goldstone, Cal., through a telephone switchboard. "This we feel, proves the compatibility of a satellite communications system with the regular Bell System telephone network," a spokesman for the Bell laboratories stated. Before the end of August, the satellite will pass behind the shadow of the earth and the inflating gas will contract. Scientists are not sure if the sphere will reinflate when it comes out from the earth's shadow. Then, too, there is still the danger of punctures from meteorites and the disrupting of orbit due to air-drag and light pressure. That will be a real test for ECHO I.

On Aug. 18, U. S. scientists failed in an effort to launch a 500-pound-communications satellite called "Courier IA" which was designed to relay radio messages. This was to be an "active" type satellite, as distinguished from ECHO I, which simply acts as a reflector. NASA and the communications industry seem to be advancing in space technology faster than the capabilities of the rockets to put the pay loads in orbit with any consistent surety. The past months, however, have certainly done much to cut down any lead that the Russians may have had. And there is great doubt that any such lead ever existed, in this special area. Telephone scientists are saying that ECHO I might prove to be the most significant single development in communications since the invention of the telephone.

A Light in Darkness

"True bravery is shown by performing without witness what one might be capable of doing before all the world." —La Rochefoucauld.

New Tunable Voltmeter is also flat AC VTVM covering 1 to 600 KC



Sierra 125A
Frequency Selective Voltmeter

As a frequency selective voltmeter, Sierra 125A covers 3 to 600 KC continuously on a 40" scale. An up-converter with high IF and single conversion keeps spurious responses down 60 db. Crystal lattices provide two steep-skirted IF bandwidths — 250 cps or 2.5 KC.

As an AC VTVM, Model 125A offers response flat within ± 0.2 db, 1 KC to 600 KC, and measurement accuracy of better than ± 0.5 db. This additional mode increases the instrument's versatility and facilitates measurements on carrier systems.

Measurement range is —90 to +32 dbm in selective mode and —30 to +32 dbm in the flat mode. Signal levels are read directly on either 135 or 600 ohm lines, balanced or unbalanced. Line bridging loss is less than 0.25 db over the entire frequency range. Built-in 100 KC crystal oscillator provides accurate reference for both level and frequency calibration. Modular construction and etched epoxy glass circuit boards provide ease of access and operating dependability.

Price, $895.00 f.o.b. factory.

For complete details, see your Sierra representative or write direct.

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News on New Products

COMPACT TRENCHER—"Compact," the much-used term in the automotive industry, now has its counterpart in the construction equipment field, Auburn Machine Works says of its new Auburn Compact self-propelled trencher.

The new Auburn trencher has a single-unit body of heavy steel plate, rigidly reinforced and electrically welded, which serves as a precision-made mounting fixture for supporting all other parts.

The four-wheel drive in both forward and reverse is powered by a hydraulic drive that automatically gives maximum trenching speeds under varying soil conditions.

The digging boom is lifted hydraulically through an arc of 186 degrees.

Auburn states it has eliminated the need for a separate trailer or truck to haul the Compact. Transport wheels, which raise and lower hydraulically, and a retractable draw bar, enable the Auburn Compact to be towed by any vehicle to the job site.

This trencher is powered by a 9 h.p. Wisconsin engine.

It can dig trenches 3 inches, 4½ inches, and 6 inches wide; and down to 5 feet deep at speeds of up to 500 feet per hour. Request NP1386.

•

TERMINAL HOUSING—The Reliable Electric Co. announces it is now marketing a pole-mounted buried wire and cable terminal housing, the No. 650 model terminal. This terminal is described as versatile, in that combinations of seven different wire terminal blocks and protectors may be installed within it. There is also room for loading coils, should they be needed; and the company emphasizes that the No.

TELEPHONY PUBLISHING CORP.
608 S. Dearborn St.
Chicago 5, Ill.

Please have the manufacturer send me without obligation the literature indicated by the following numbers:

NP1386_____; NP1387_____; NP1388_____; NP1389_____;

NP1390_____; NP1391_____; NP1392_____; NP1393_____;

NP1394_____; NP1395_____; NP1396_____; NP1397_____;

NP1398_____; NP1399_____.

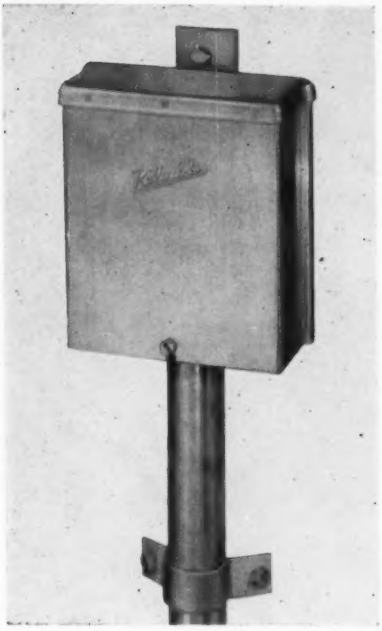
Name.....

Company.....

Street.....

Town and State.....

8/27/60



650 terminal can be tailor-made for a specific job at the job site.

The terminal housing is made of aluminum, and the "U" guard of gal-

vanized steel. For highly corrosive areas, Reliable states, the No. 650 model is available in a corrosion-resistant covering. Request NP1387.

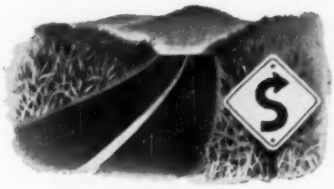
•

TRANSISTORIZED FAULT ALARM—The Texas Division of Collins Radio Co. has developed a completely transistorized fault alarm for its microwave systems which is capable of reporting 11 or 17 different fault conditions from as many as 30 remote stations.

A transmitter at each remote station

Whatever your brush problem

Line?



Roadside?

Right-of-way?

WEEDONE can solve it!

With the right background—Chemical control of weeds and brush has developed along established lines of procedures and practices. Amchem initially pioneered the major advances in the field, has originated many of today's accepted procedures and products for efficient, economical weed and brush control. Your problems are in *experienced* hands when you hand them to Amchem!

With the right approach—Amchem's corps of weed and brush specialists are basically application specialists. Combining comprehensive theoretical and practical experience they are able to offer all industry a realistic approach to *any* weed or brush problem. These specialists have developed a variety of efficient weed and brush eradication programs over thousands of miles of line, roadside and right-of-way areas once choked and inoperable due to infestation.

With the right product—Amchem's tremendously diversified product line is your assurance that the right weed and brush killer is available and will be utilized for your specific problem. Weedone Brush Killers, for example, have been used in the field for years and proven eminently successful in eliminating weeds and brush wherever they are a problem. Why not bring your problems to Amchem?

Amchem and Weedone are registered trademarks of Amchem Products, Inc.

AMCHEM PRODUCTS, INC.
AMBLER, PA.

Please send me copies of your "Brush Control" brochure and full information on the uses of Weedone Brush Killers.

Name_____ Title_____

Company_____

Address_____

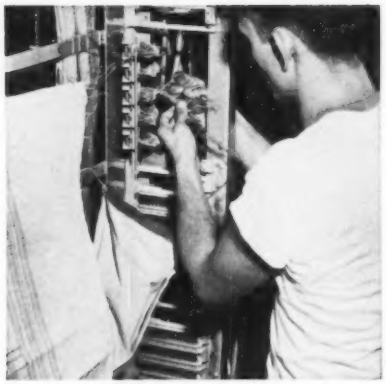
City_____ Zone_____ State_____

AMCHEM

WEEDONE

BRUSH KILLERS

another chemical development of
Amchem Products, Inc.
(Formerly American Chemical Paint Co.)
St. Joseph, Mo. • AMBLER, PA. • Niles, Calif.



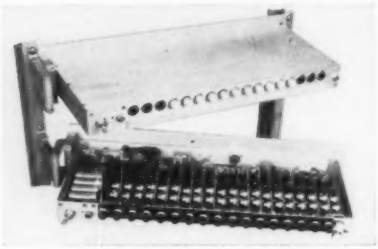
New techniques in COMMUNICATIONS

Gustav Hirsch Organization, Inc., offers the most comprehensive program in the communications industry — skilled engineering, quality construction and many special services.

GHO projects include toll dialing, microwave circuiting and automatic switching. For expansion or an entirely new system, GHO is ready to serve you.

continuously scans for faults and simultaneously reports to its associated receiver at a supervisory station every four seconds by means of a single am tone, Collins states.

Tones can be set within one of five ranges between 1 and 30 kc. The number of stations reporting over a single communication channel may be increased at any time by simply adding transmitter and receiver pairs and tuning them to unused frequencies. Because tone spacing is at intervals similar to that in FSK telegraphy, upwards of 30 separate remote stations can report over a single baseband without interfering with other communications.



Both transmitter and receiver display fault reports by means of lights on the front panel, with a separate light for each fault. The receiver also has lights for a confidence check on the transmitter and on received data. A remote alarm signal is also provided by the receiver.

Transmitter output may be bridged directly on the baseband, while receiver inputs may be bridged on an isolation amplifier or service channel output.

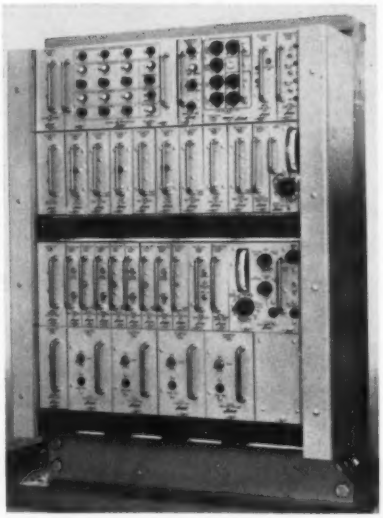
Besides fault reporting, the company says the transmitter and receiver may be used for binary data communication or remote control. For very large systems, the transmitters and receivers may be arranged for automatically interrogated operation. Request NP1388.

•

TRANSISTORIZED PATH PROTECTION SYSTEM—The Lenkurt Electric Co. announces that its new Type 57A, transistorized path protection system, which is going into production late this year, offers standby protection for up to three working microwave radio channels.

Lenkurt terms the new protection system a "significant improvement over dual diversity systems requiring one standby channel for each working channel." The company claims that standby provided by this multiple approach costs less and requires fewer RF transmission allocations.

Of interest to data and telegraph carriers is a 57A feature that precludes signal interruptions and level changes when transfer is due to fade. Lenkurt



states that this transfer is completed without *any* interruption of service. Sensitivity can be set for signal-to-noise ratio ranging from 32 to 52 db.

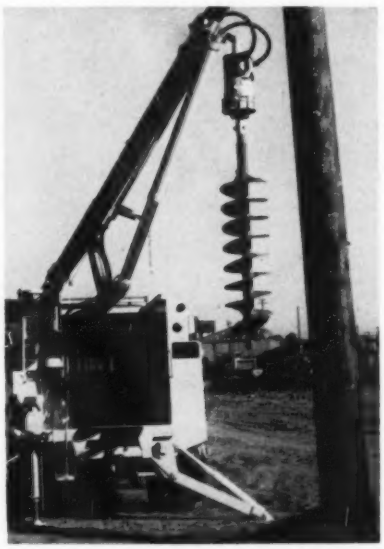
In the 6,000-7,000 mc bands, a protection section of 57A can be up to eight hops. Additional terminals are required for sidelegs.

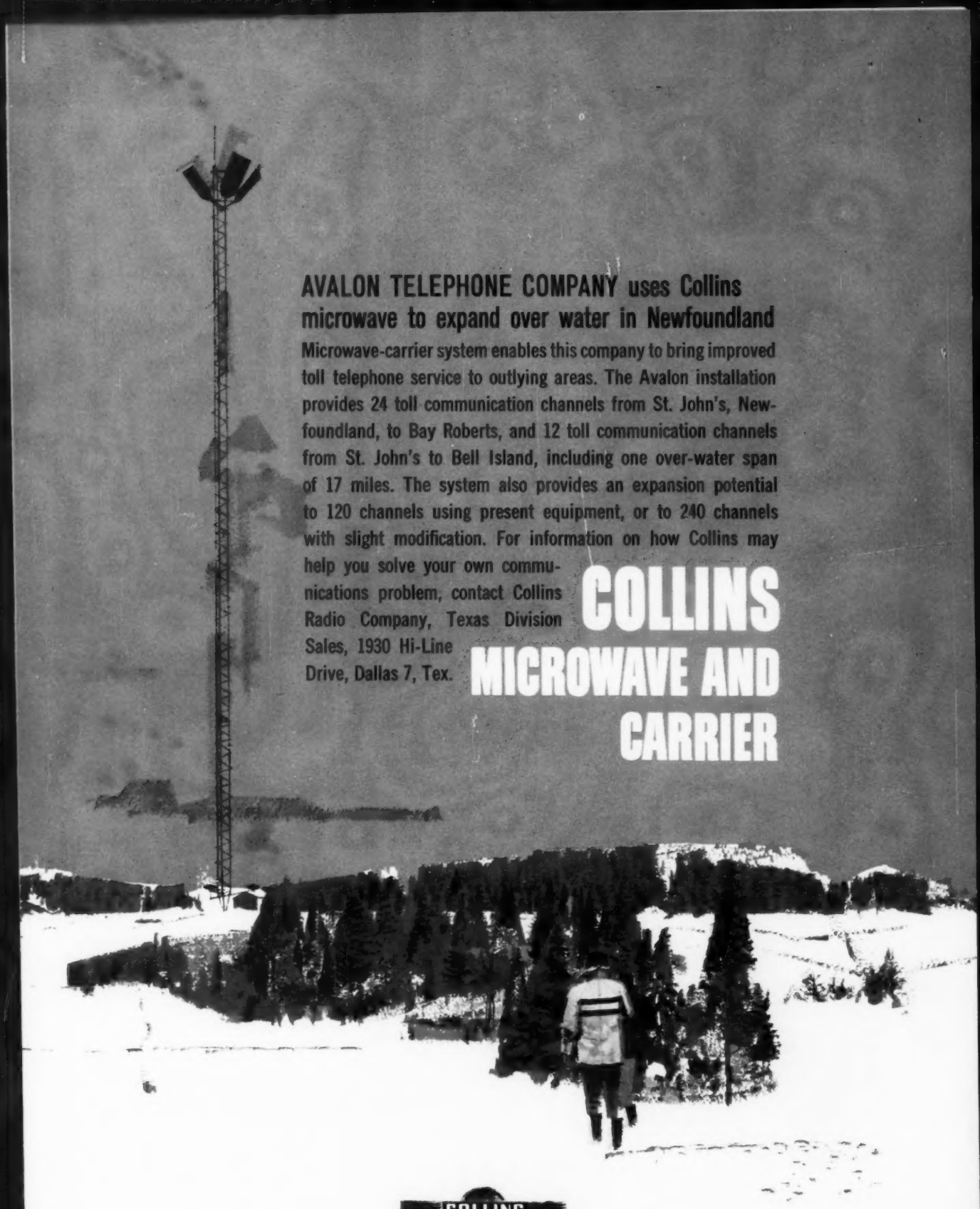
The Type 57A path protection is designed for use with Lenkurt 74A radio, which can accommodate up to 264 single-sideband suppressed carrier channels per system, and, according to the company, can be adapted to other radio and multiplex equipment, as well. Request NP1389.

•

CORNER-MOUNTED DERRICK — A new corner-mounted power derrick, designed especially for working in narrow streets, alleys and congested areas, is being manufactured by Holan Corp.

The derrick is engineered as a com-





AVALON TELEPHONE COMPANY uses Collins microwave to expand over water in Newfoundland

Microwave-carrier system enables this company to bring improved toll telephone service to outlying areas. The Avalon installation provides 24 toll communication channels from St. John's, Newfoundland, to Bay Roberts, and 12 toll communication channels from St. John's to Bell Island, including one over-water span of 17 miles. The system also provides an expansion potential to 120 channels using present equipment, or to 240 channels with slight modification. For information on how Collins may help you solve your own communications problem, contact Collins Radio Company, Texas Division Sales, 1930 Hi-Line Drive, Dallas 7, Tex.

COLLINS MICROWAVE AND CARRIER

COLLINS

COLLINS RADIO COMPANY • DALLAS, TEXAS • CEDAR RAPIDS, IOWA • BURBANK, CALIFORNIA

KLEINS

for LINEMEN and ELECTRICIANS

The Original Klein Side Cutting Plier—Also available in NE (Streamlined) type. Cat. No. 201

High Leverage Plier—Extra high leverage permits cutting extremely tough wire. Also available in the standard type as shown above. Cat. No. 213-9NE

High Leverage Oblique Cutting Plier—A recently introduced plier designed to cut toughest wire. Cat. No. 228-8

Electrician Conduit Plier—Reams inside and outside of conduit, tightens lock nuts in outlet boxes. Cat. No. 333-8

"Since 1857" the name Klein has stood for the finest in tools and equipment for linemen and electricians. It is the uncompromising high quality back of the name Klein that has won Klein Pliers their place in the hands of men who know good tools. Klein Pliers are now available in a wider variety of styles and sizes than ever before. Be sure the pliers you need carry the Klein trade-mark.

Klein Catalog Free—This new Klein catalog giving complete information on Klein tools and equipment for linemen and electricians will be sent on request. Write for your copy.

Ask Your Supplier—Foreign Distributor: International Standard Electric Corp., N.Y.

Mathias Established 1857 **KLEIN** & Sons Chicago, Ill., U.S.A.
7200 McCORMICK ROAD • CHICAGO 45, ILLINOIS

plete unit to avoid body and derrick stresses. Known as the 7500, it has a horizontal sweep of 110° to permit boring and pole-setting behind and to the curbside of the truck. Holes up to 30 inches in diameter can be bored as deep as 8 feet without using an auger extension, and 12-foot holes can be bored with an auger extension.

Holan states that the derrick is mounted on the left hand side of the body, but right hand side mounting is available. A semi-automatic locking device for the earth borer allows the borer to be moved by the extendible boom or locked for storage at the end of the main boom. When finished boring, the operator retracts the boom and the borer automatically locks itself onto the main boom. When the extendible boom is needed again, it moves out free of the earth borer.

The 7500 has an up and down feed pressure ranging from 3,600 to 5,400 pounds.

The Holan derrick elevates to a maximum height just beyond 20 feet without the extendible boom; 27 feet-6 inches with boom extended, and will handle 70-foot poles. The design of the boom end permits easy installation of an extra 2-foot section for added height. It is able to "live boom" up to 8,500 pounds, and lift up to 10,000 pounds with the winch line. Request NP1390.

•

CRAWLER-MOUNTED TRENCHER —The Charles Machine Works, Inc. announces a new crawler-mounted Ditch Witch trencher series, available in all its M series machines, in either 9 or 12-horsepower models.

The company states that these crawler trenchers are especially suited to applications where traction or flotation is marginal, or where a considerable amount of maneuverability is required.

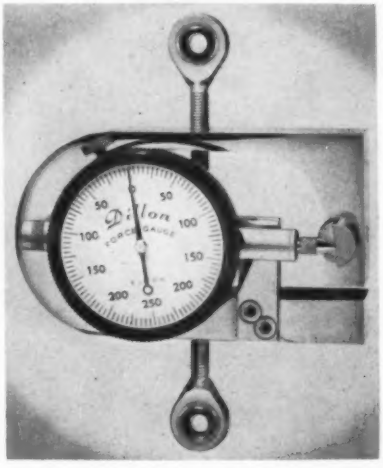
The new crawler trencher is self-propelled and equipped with a steering device which, as the company describes it, takes the "muscle" out of maneuverability.

For digging in frost conditions and rocky soil, the Ditch Witch trencher has proven adaptable because of its extra weight. The company also terms it an efficient machine for digging foundation footings.

The Charles Machine Works is also producing a crawler adapter kit which facilitates mounting any M-3 series trencher produced in 1959 or 1960. Request NP1391.

•

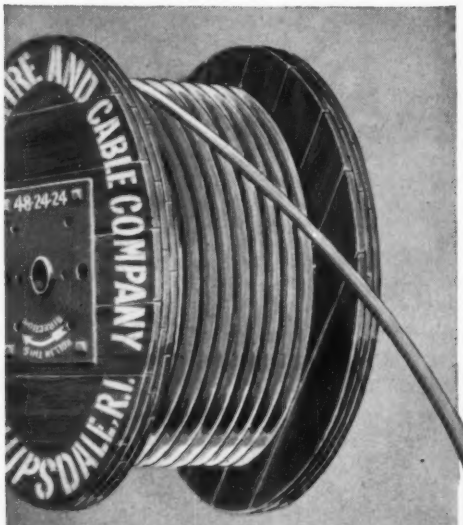
PUSH-PULL GAUGE—A new Dillon Push-Pull gauge is said to do the work of two separate compression and tensile-measuring devices. The split-dial gives readings of compression loads and tensile loads. Also, it can be hooked into a system to measure and control oscillating loads in compression and tensile.



The Push-Pull gauge is adapted to situations where pressure, tensile, or torque loads are to be measured. Testing shut-off valves, checking calibration of other devices, measuring tension in moving wire, testing mechanical efficiency of hydraulic door closers, preventing overloading of conveyor systems, and setting spring adjustments are listed as typical of the many uses for which this Dillon gauge is designed.

These compression-tensile gauges are individually calibrated in capacities of 5-0-5; 12.5-0-12.5; 25-0-25; 50-0-50; 125-0-125; 500-0-500; 1,250-0-1,250; 2,500-0-2,500; 5,000-0-5,000; 12,500-0-12,500; and 25,000-0-25,000 pounds. Dillon states accuracy is guaranteed to within 1 per cent ± of full-scale reading.

All units, either split-dial push-pull



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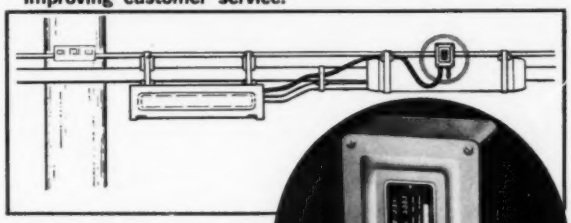
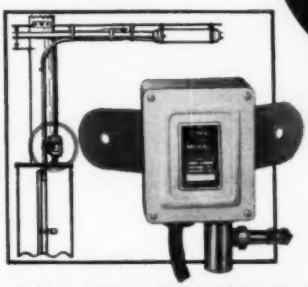


Cable Mounted
TYPE J31-5333



Pole Mounted
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WHY A PRESSURE GUARD IS ESSENTIAL FOR MAXIMUM EFFICIENCY IN PRESSURIZED CABLE SYSTEMS

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- The Pressure Guard provides one more value that may be detected at the test desk.
- The Pressure Guard transmits its signals via working subscriber lines rather than requiring special circuits.
- The Pressure Guard reduces cable maintenance costs and improves customer service at very low cost.
- The Pressure Guard's low cost permits liberal usage for maximum protection.

SPECIFICATIONS

TYPE J31-5333

Field Adjustment Range	0 to 10 PSI
Factory Setting	2 ±¼ PSI on falling pressure
Pressure Response	4 ±½ oz.
Proof Pressure	30 PSI
Electric Rating	0.01 amp 100 V DC
Load Resistor	Carbon composition 270,000 OHM 1 watt

Drop Wire .....6′ Type SJO#18 stranded 2.0 conductor
Pressure connection: ⅛ NPT (⅛ x ⅛ elbow provided separately; usually not required with direct sleeve mounting).

TYPE J31-5338

Same as above with the addition of pole mounting provisions and 6′ of copper tubing.

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types, or other specific compression or tensile instruments, can be supplied with micro switches. Request NP1392.

•

REMINGTON-RAND LEASE PLAN—A long-term lease plan involving all typewriter, adding-calculating machine and systems products has been announced jointly by Kenneth R. Herman, president of the Remington Rand Division of Sperry Rand Corp., and Robert Sheridan, president of the Nationwide Leasing Co. The Nationwide company will underwrite the Remington Rand lease program throughout the country.

"This new plan has been developed to meet the needs of both the smallest businesses and giant corporations," Mr. Herman said. "Management can now introduce cost-saving equipment into its offices without expenditure of working capital. For many firms, it will be possible to pay the monthly leasing charges out of money saved by the new equipment."

Leases can range, for example, from as low as $175 for a single adding machine up to hundreds of thousands of dollars for complete office systems. Where additional equipment is included under a master lease, a single transaction could involve several million dollars, according to Remington Rand.

Leases will normally range from 39 to 65 months, but in special situations, the company says, agreements may be made for as short a period as two years or for as long as 10 years. Renewal options are standard. Request NP1393.

•

OCTAVE BAND ANALYZER—A new Octave Band Analyzer—Model 532—a compact, lightweight, audio spectrum analyzer that is very simple to operate is offered by the Allison Laboratories, Inc. This analyzer can be used in conjunction with a sound-level meter, tape recorder, microphone preamplifier and similar equipment, and is useful for analysis of environmental noises, complex audio signals, production line testing, noise-level acceptance, and speech-interference levels.

The filters are passive network type with a high attenuation rate.

Another feature is the band selector of low torque, continuous in rotation, and suitable for an auxiliary drive.

Allison describes its new Octave Band Analyzer as using low power and yet having a dynamic range of 66 db.

Request NP1394.

•

SUBAUDIO VARIABLE FILTER—Allison has also produced the new Subaudio Variable Filter, Model 201, as an extension of its Series 2 variable-frequency passive network filters.

The 201 Filter is termed a versatile laboratory instrument, with independent high cutoff and low cutoff sections. Its multiplier dial is tunable over a range of one octave; the range switch changes the cutoff in octave steps, and a chart

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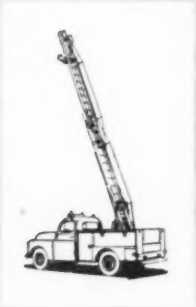

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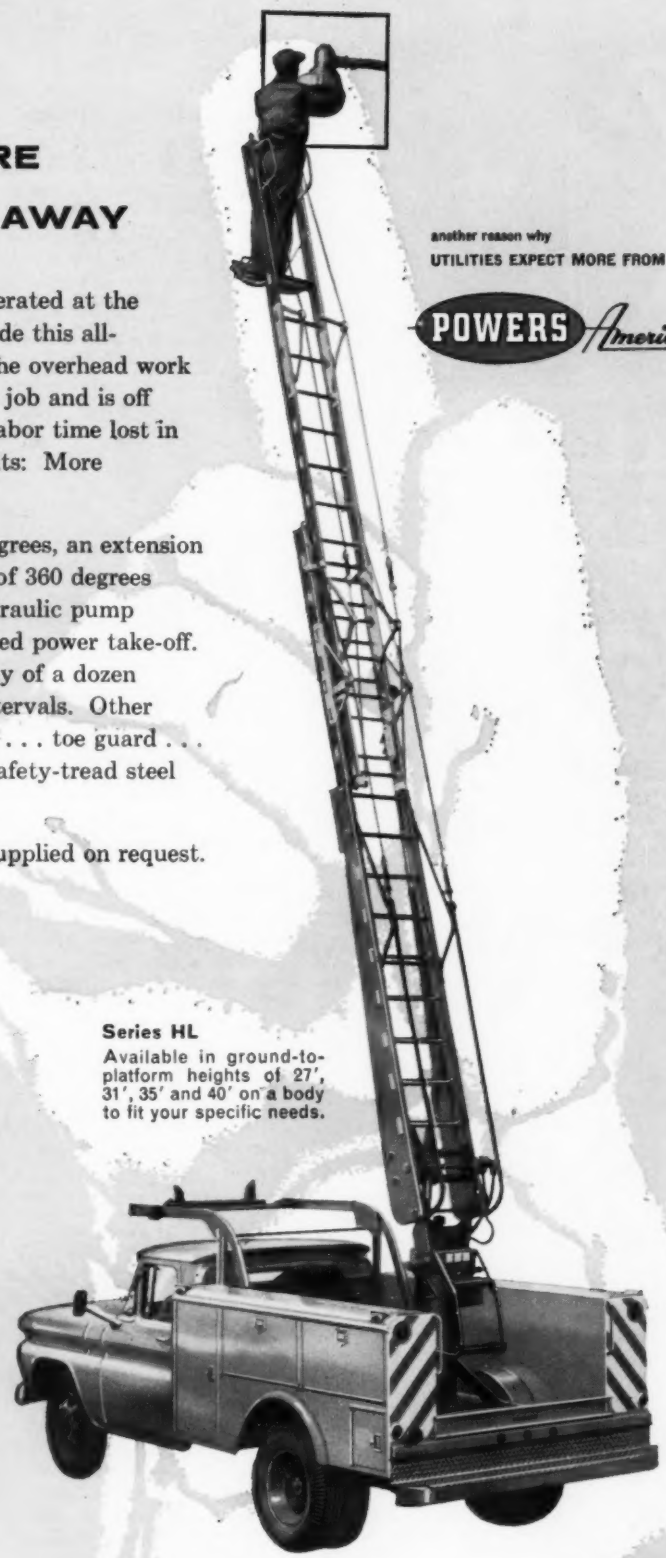

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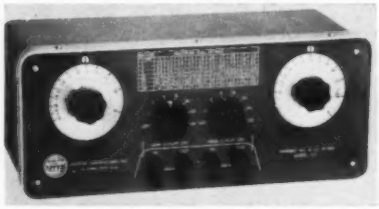
is provided for reading the multiplier dial directly in cps.

Other features of the 201 are: a smooth pass band with low insertion loss, sharp cutoff, and a constant attenuation rate.

There are no transistors, no vacuum tubes, and no power supply, the company states. Noise level is extremely low, the company says, for these reasons. Noise level will be primarily determined by the pickup in the leads.

This is an LC type filter, and the distortion introduced is dependent upon the voltage applied to the inductors. At ½ volt, the distortion will be approximately .1 per cent.



With only the high cutoff section on, Allison says, the filter will pass from dc to the cutoff frequency. With only the low cutoff on, the filter will pass from the cutoff frequency up to at least 50 kc. Frequency coverage is 1-256 cps.

Allison sums up the adaptability of its new Subaudio Variable Filter as suitable for: "studies of low-level transient phenomena, studies involving the subaudio frequency spectrum, such as: heart studies, geophysical work, thermocouples, and low-frequency vibrations." Request NP1395.

•

POWER SUPPLY—A new series of heavy-duty, regulated dc power supplies is available from the Raytheon Co. The new 132 models of this "RD" series range in output from 3 to 1,000 volts, and from 50 to 3,000 watts.

These new power supplies are self-protecting, says Raytheon, against damage from overload and short circuits. Good voltage regulation is obtained by the use of a ferroresonant, line-regulating transformer in conjunction with low forward-drop silicon rectifiers. A capacitive input filter is said to reduce ripple to within ± 1 per cent. Request NP1396.

ADJUSTABLE POWER SUPPLY—Announced by Sorensen & Co., a Raytheon subsidiary, is a new "Varivolt" adjustable ac power supply to handle loads ranging from 0 to 500 volt-amperes.

The Sorensen "Varivolt" has a nominal 115-volt, 60-cycle, single-phase input; and provides a regulated, 60-cycle output voltage, adjustable from 0 to 260 volts. Magnetic voltage regulation holds output voltage within ± 0.5 per cent of maximum for line input variations from 95 to 130 volts ac. A typical load regulation is less than 5 per cent for a 50 per cent load change.

The magnetic voltage regulator of this power supply is tubeless and employs no moving parts.

Sorensen says the "Varivolt" is an economical source of correct ac voltages for counters, relays, solenoids, filaments, etc. It serves reliably also as a check on component or circuit performance with variable ac input, the company states.

Response time is 2 cycles, or less, and harmonic distortion does not exceed 3 per cent. An auxiliary, fixed, regulated 115-volt ac output is provided. Request NP1397.

•

AUTOGRAF RECORDER — A new two-pen, two-axis graphic recorder is now available from the F. L. Moseley Co., the Model 4B.

The new Moseley Autograf Recorder, Model 4B, plots $Y_1=f_1$ (x) and $Y_2=f_2$ (x) simultaneously, or, when the instrument's time base feature is used, it plots $Y_1=f_1$ (t) and $Y_2=f_2$ (t) simultaneously. A built-in sweep circuit provides the time base feature in the X axis, Moseley states.

The new model's recording surface is oriented vertically, with controls mounted conveniently on a panel below. The entire table, recording mechanism and control panel tilt outward as a unit, facilitating front-of-rack access to the

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C. M. Christiansen Co. — Northern White Cedar Poles, Pentachlorophenol treated. Plant and Yards, Phelps, Wis.

Dierks Forests, Inc., Wood Preserving Division, 810 Whittington Ave., Hot Springs, Arkansas. Southern Pine select poles all sizes and lengths, pressure-treated, creosote or penta. Also creosote-2% penta mixture. Prompt shipment.

Eppinger & Russell Co., 80—8th Avenue, New York 11, N. Y.—Creosoted Poles and Cross Arms. Plants: Jacksonville, Fla., Norfolk, Va., Eddington, Pa.

International Creosoting and Construction Co., Galveston, Texas.—Creosoted Southern Yellow Pine Poles. Plants Beaumont and Texarkana, Texas.

International Paper Co., Wood Preserving Division — 926 Grand Avenue, Kansas City, Missouri—"LONG-BELL" pressure-treated Southern Pine and Douglas Fir Poles—Creosote or Penta.

Piedmont Wood Preserving Company —Creosoted and Creosote-Penta Treated Pine Poles. Plant, Augusta, Georgia. Yards, Virginia, West Virginia and Connecticut. Address inquiries to Box 1662, Spartanburg, S. C.

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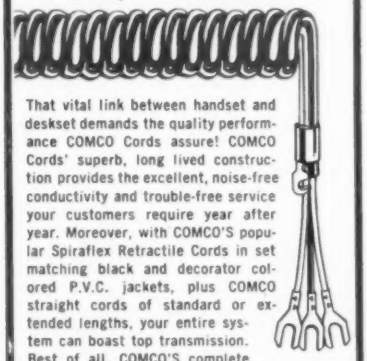

That vital link between handset and deskset demands the quality performance COMCO Cords assure! COMCO Cords' superb, long lived construction provides the excellent, noise-free conductivity and trouble-free service your customers require year after year. Moreover, with COMCO'S popular Spiraflex Retractile Cords in set matching black and decorator colored P.V.C. jackets, plus COMCO straight cords of standard or extended lengths, your entire system can boast top transmission. Best of all, COMCO'S complete line includes cords with the construction, terminals and strain relief you require, and immediate delivery is COMCO'S pride.

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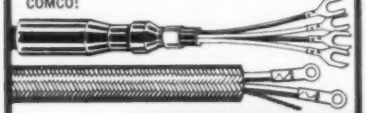

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Model 4B features full range zero set and one full scale of zero suppression on each axis. It also has input filters on each axis to permit smooth plotting of "noisy" data.

Request NP1398.

•

SOIL RESISTANCE MEASURING INSTRUMENTS—A new instrument for measuring soil resistance, the Model 293 Vibroground, described as having a resistance-measuring range ten times that of previous models, is announced by Associated Research.

The new Vibroground measures soil resistivity up to 86,650 ohms per cubic centimeter, when employed with a single rod resistivity set-up.

For determining anode resistance and other effects where two or three electrode set-ups may be employed, soil resistance up to 10,000 ohms may be measured.

Resistivity of soil test samples in soil boxes may be read directly up to 10,000 ohms per cubic centimeter.

These higher resistance measuring ranges are also particularly useful in evaluating the protective coating on pipe lines, tanks and other buried metal structural elements, the company states.

The Vibroground weighs only 10 pounds complete with self-contained battery supply. Request NP1399.

SW Bell Combines Directory, Sales, Merchandising Groups

Seeking to more effectively plan sales efforts to meet subscribers' needs, Southwestern Bell Telephone Co. on Aug. 15, established a new general headquarters organization made up of the sales, directory and merchandising groups.

Ben Smith, general merchandising manager, heads the new organization. A general sales manager and a general directory manager and their staffs will report to him.

The general sales and general directory groups previously reported to the commercial operations engineer.

"This change was made to better assist our area organizations in providing business and residence subscribers with new and better services and equipment," Mr. Smith said.

He stated that the efforts of the new organization will be focused on protecting present revenue, developing additional sources of profitable revenue,

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Mr. Smith has been general merchandising manager for Southwestern Bell since 1956 and previously was assistant general manager for operations in the company's Texas area. He also has been general commercial manager in Texas and early in his career held a number of supervisory positions in directory sales for the company.

Sallee Heads Production Control for Dialaphone

The appointment of Charles J. Sallee as supervisor of production control for Dialaphone, 2515 Palm Place, San Mateo, Cal. has been announced by Austin M. Elliott, vice president and general manager.

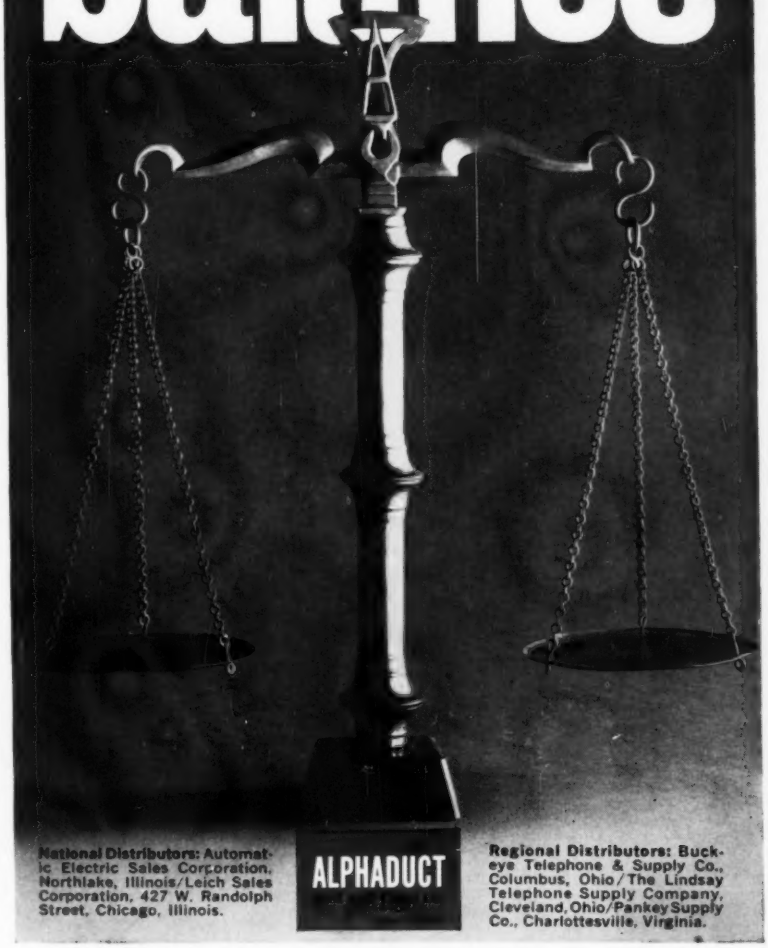
Mr. Sallee was formerly production control manager of the electron tube division of Litton Industries for nearly six years. Previously he was with Hiller Aircraft and United Air Lines.

The Dialaphone company manufactures an electro-mechanical companion to the telephone that dials numbers automatically, which is offered through telephone companies.

Smith to C&P of Md. Post

L. Mercer Smith, vice president—marketing of the Chesapeake & Potomac Telephone Companies, has been elected vice president and a director of the Chesapeake & Potomac Telephone Co. of Maryland. Mr. Smith succeeds W. Griffin Morrel, who resigned to accept the position of executive vice president of the Black & Decker Mfg. Co. Mr. Morrel will continue as a director of the C&P company of Maryland.

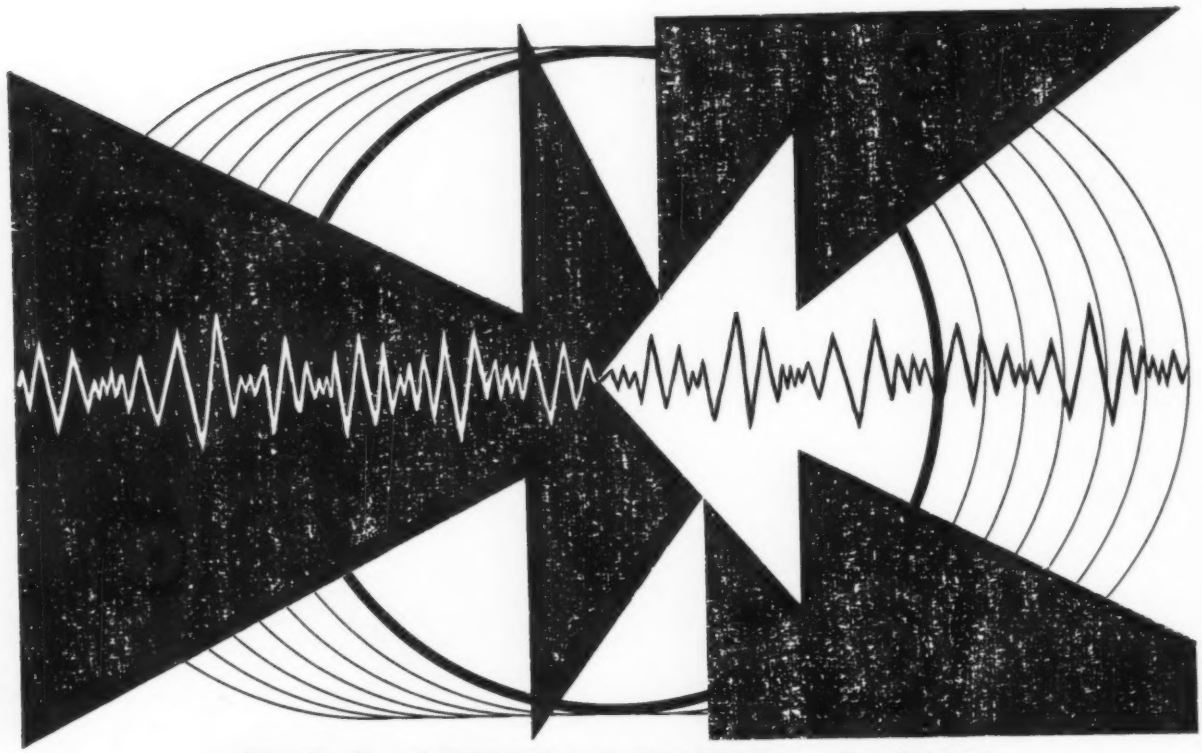
Reinforced
drop wire with built-in
balance



National Distributors: Automatic Electric Sales Corporation, Northlake, Illinois/Leich Sales Corporation, 427 W. Randolph Street, Chicago, Illinois.

ALPHADUCT

Regional Distributors: Buckeye Telephone & Supply Co., Columbus, Ohio/The Lindsay Telephone Supply Company, Cleveland, Ohio/Pankey Supply Co., Charlottesville, Virginia.



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1/2"x22" .. .25
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26 pr., 6' stub .. 12
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G-26, bind post chamb. 10
H-51, bind post chamb. .... 20 (12 ft. stub)
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LC 16, complete 45
LC 26, complete 60
LA 51, complete 100
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with protection 30

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See W.E. Catalog #11—Page 157

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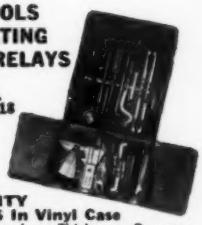

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